

PROCTORING THE JOINT FORCE:
NETWORKS, HIERARCHY, AND 21ST CENTURY WARFARE

BY
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The undersigned certify that his thesis meets masters-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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ABSTRACT

This study analyzes the prospects for a joint center to exercise command and control (C2) over United States (US) Joint Forces. The idea for such a center emanates from the need for joint warfighting efficiency and the emergence of the Standing Joint Force Headquarters (SJFHQ). The study assesses the compatibility of a joint center with individual service doctrine as well as net-centric environments (NCE) and net-centric operations (NCO). It concludes that a joint C2 center is incompatible with the preponderance of service doctrine, and is diametrically opposed to the concept of NCO. Instead, a Joint Planning and Monitoring Center (JPMC) could plan and monitor the joint fight, accomplishing many of the same goals of efficiency that a C2 center might. In execution, the Joint Force would conduct net-centric warfare (NCW) wherein subordinate empowerment prevails on the battlefield, focused by mission-orders and commander's intent. The paper concludes with recommendations to field the NCE, create the JPMC, and to adapt service doctrine to operate in the NCE and conduct NCW.

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Introduction

The Need for Efficiency

“I had trouble with the Fire Support Coordination Line placement...At one point after the ground war started, the FSCL was well north of the Tigris River, yet all the Iraqi army was on the interstate highway between Kuwait City and Basrah approaching the river from the south, making the river an ideal FSCL...The Iraqi army was getting across the river, giving them a free ride since we had to attack under close air support rules with no [forward air controllers] in the area.”¹

Lt Gen Charles “Chuck” Horner, USAF
Desert Storm Air Component Commander

The *Goldwater-Nichols Department of Defense Reorganization Act of 1986* (GNA) reorganized the United States (US) military command structure in the most far-reaching organizational change since the creation of the Air Force as a separate entity in 1947.² Motivated by major inter-service rivalry problems and operational failures in the 1970s and 1980s, GNA sought to change the way the services interact. This restructuring effort afforded improved unity of effort, integrated planning, and a reduction in inter-service rivalry between commanders.

GNA addressed unity of command through the creation of a temporary Joint Force Commander (JFC).³ The JFC is a designated Joint Task Force (JTF) commander with “the authority and responsibility to tailor forces for the mission at hand, selecting those that most effectively and efficiently ensure success.”⁴ The concept of organizing forces under a JTF commander has been used to great effect since Operation Desert Storm in 1990. However, each time a crisis erupts, the US creates a JTF from scratch, siphoning people and equipment

¹Quoted in Mick Quintrall, *A Change-Challenge* (Air & Space Power Journal, Fall 2002), 8.

²“Goldwater-Nichols Act,” *Answers.com*, n.p., on-line, Internet, 18 May 2005, available from <http://www.answers.com/topic/goldwater-nichols-act>.

³“Goldwater-Nichols Act.”

⁴Joint Publication (JP) 1, *Joint Warfare of the Armed Forces of the United States*, 14 November 2000, III-3.

from other commands. When the contingency is over, the JTF disbands.⁵ Many people believe this sort of ad hoc practice lends itself to organizational inefficiencies within the Joint Force.

To rectify this inefficiency, the Department of Defense (DoD) has taken steps to create a Standing Joint Force Headquarters (SJFHQ) for each combatant command worldwide. These headquarters (HQ) are to be equipped with the most capable command, control, computers, communications, intelligence, and surveillance assets the US military has available. The permanent staff also will train to a common standard and be expert about how the Joint Force is to function in battle. The goal is to begin fielding the SJFHQ in Fiscal Year 2005.⁶ All of this raises a question: How will the SJFHQ plan, monitor, command and control (C2), and assess the joint fight?

Componency Planning

The US military conducts contingency planning and operational execution in a less than optimum and piecemeal fashion. Although a JFC is ultimately responsible for conceptualizing the planning and conduct of a military campaign, the individual components conduct the actual planning and operational-level execution. For all practical purposes, each individual service stands up and maintains its own planning organization at the outbreak of a contingency.

Commanded by the Joint Force Air Component Commander (JFACC), the United States Air Force (USAF) conducts air campaign planning and C2 via an Air Operations Center (AOC). The Joint Force Land Component Commander (JFLCC) heads the land component planning, to include the United States Army and United States Marine Corps (USMC), at the JFLCC HQ. The Joint Force Maritime Component Commander (JFMCC) commands the United States

⁵Department of Defense, *Annual Report to the President and Congress*, 2003 (Washington, D.C.: Government Printing Office, 2003), 69.

⁶*Annual Report to the President and Congress*, 69.

Navy's operational planning and maintains C2 afloat aboard ship at the JFMCC HQ. Within this scheme, component campaign planning becomes an exercise in large-scale deconfliction.

The planning each component conducts, however, is not done entirely in isolation from the other services. As a matter of doctrine, the components dispatch representatives to these planning cells to serve as liaisons to represent the interests of their individual service. For example, the USAF maintains an Air Support Operations Center (ASOC) as the senior liaison with the Army in order to control Close Air Support (CAS) aircraft. The USMC uses a Direct Air Support Center (DASC) for the same purpose. The Army maintains a Battlefield Coordination Element (BCE) at the USAF AOC for what are essentially deconfliction purposes. Regrettably, however, these organizational representatives are often less than effective in shaping the planning and execution of the operation. The parochial interests of the 'primary' service ultimately take precedence. The result is a suboptimum joint operation that fails to maximize synergy among the services. In effect, these liaisons act as agents of deconfliction and coordination rather than as integrators and facilitators. In the end, the joint planning 'system' is not conducive to creating desirable synergistic effects in a campaign plan and a correspondingly efficient operation. This planning system leads to unnecessary friction for friendly forces on the battlefield, while creating opportunities for US adversaries.

Unintended Sanctuary

In each of the last three major campaigns involving US ground forces, inadequate planning and battlefield coordination led to situations wherein enemy ground forces were inadvertently offered, at least temporarily, freedom from attack by both coalition ground and air forces. In his June 2004 SAASS thesis, "Framing the Sweet Spot: Integrating Joint Fires in the Modern Battle Space," Major Dan Ourada illustrates three relevant case studies which highlight this deficiency: one case from Operation Desert Storm (ODS), one instance in Operation Enduring Freedom (OEF), and one occurrence during

Operation Iraqi Freedom (OIF). In each case, enemy forces gained a reprieve from coalition attack when the enemy could have, and should have, been annihilated with relative ease by either land or air forces. The cause of each of these three unintentional sanctuaries was ineffective Fire Support Coordination Measures (FSCM).

Fire Support Coordination Measures and Deconfliction

Fire support coordination measures provide a means of deconfliction by which commanders ensure troop safety, integrate fire support with tactical operations, and expedite attacks on targets.⁷ With the advances of modern weapons and changes in the roles of the combatants, however, questions concerning the validity of some FSCMs have surfaced. The fire support coordination line (FSCL), for example, has essentially become a restrictive boundary to the USAF--yet the Army, Navy, and Marines consider it a permissive measure.⁸ The FSCL is supposed to be a tool to help the battle run smoothly; however, it is a source of argument between the U.S. services, who haggle over exactly what the FSCL will do.

From an airpower perspective, the entire concept of FSCMs is conducive to neither integration nor synergy, and does not foster effective Joint Force employment. FSCMs, particularly when used in a restrictive manner, drastically reduce the flexibility, latitude, and effectiveness of supporting fires. In essence, FSCMs are a tool designed to deconflict supporting fires from the ground component's campaign plan. But FSCMs do not integrate ground forces and supporting fires into a single, synergistic, overall campaign plan. In ODS, OEF, and OIF, the FSCMs were employed as restrictive measures rather than as permissive measures, which had the effect of hamstringing supporting fires and preventing them from attacking when the tactical situation dictated otherwise. Avoiding fratricide seems to have been the overriding priority, not

⁷Major Robert D. Dozier, "The FSCL: Is It Still Valid Today?" *GlobalSecurity.org*, 6 April 1992, n.p., on-line, Internet, 30 May 2005, available from <http://www.globalsecurity.org/military/library/report/1992/DRD.htm>.

⁸The fire support coordination line (FSCL) is a line beyond which any target may be engaged by any weapons system without the requirement for coordination prior to the engagement.

operational campaign efficiency and effectiveness—and perhaps rightly so. These goals, however, are not mutually exclusive. Rapidly evolving technological improvements afford the US the opportunity to develop and implement a planning mechanism and a corresponding command capability to move beyond component campaign planning and operational deconfliction.

With these considerations in mind, is there anything to be done to mitigate the negative effects of FSCMs in a joint fight? Is it time to take the giant step forward into the realm of a joint center?

A Joint Command and Control Center?

Joint doctrine mandates that the components conduct planning and operational execution, which will yield synergistic effects, not simply deconflict operations from each other. Doctrine tasks the JFC to “synchronize and integrate the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated, joint campaigns and major operations”⁹ Recent operations, however, have shown a lack of synergy and integration on the battlefield. A joint center could go a long way toward achieving the synergy joint doctrine mandates.

A joint center as envisioned in this thesis is a mid-range future organizational concept that would replace each geographically separated, component-command HQ and consolidate them under one roof. It would be a net-centric-environment-based organization with the resources to facilitate collaborative campaign planning while providing commensurate support and monitoring during execution of a self-synchronizing joint fight.¹⁰ At the same time, a network-enabled joint center would maintain the ability to conduct

⁹JP 3-0, *Doctrine for Joint Operations*, 10 September 2001, x-xii.

¹⁰Self-synchronization is a highly decentralized C2 method that calls for lower-level decision makers to be guided only by their training, understanding of the commander’s intent, and their awareness of the situation in relevant portions of the battlespace. In some variants of this concept there is a provision for management by exception (i.e. the commander can negate lower-level decisions on an exception basis). Three prerequisites must be in place for self-synchronization to take place and succeed. There must be a body of doctrine to support the actions, and that doctrine must be well understood and forces trained in its use. Communications must exist among the units that self-synchronize to accomplish a common objective. Finally, clear commander's intent must provide the conditions and rules under which self-synchronization can and cannot occur.

centralized C2 of Joint Forces should the scale of operations permit and/or the political situation dictate. The joint center would also be responsible for operational assessment and battle damage assessment (BDA). Operational lessons learned, however, would be left to an external agency so as to maintain objectivity.

Operating in a net-centric environment (NCE) would be crucial for such an organization. The DoD's *Net-Centric Environment Joint Functional Concept (NCE JFC)* defines the NCE as a framework for full connectivity and interoperability that allows all users to share information they need, when they need it, in a form they can understand and act on with confidence; and one that protects information from those who should not have it.¹¹

Military operations conducted within the NCE are called net-centric operations (NCO). The *NCE JFC* defines these operations as “the exploitation of the human and technical networking of all elements of an appropriately trained joint force by fully integrating collective capabilities, awareness, knowledge, experience, and superior decision-making to achieve a high level of agility and effectiveness in dispersed, decentralized, dynamic and uncertain environments.”¹²

By extension, net-centric warfare (NCW) is an “information superiority oriented concept of operations that generates increased combat power by networking sensors, decision-makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization.”¹³ See Figure 1.

¹¹NCE JFC, 1.

¹²NCE JFC, 1.

¹³NCE JFC, B-5.

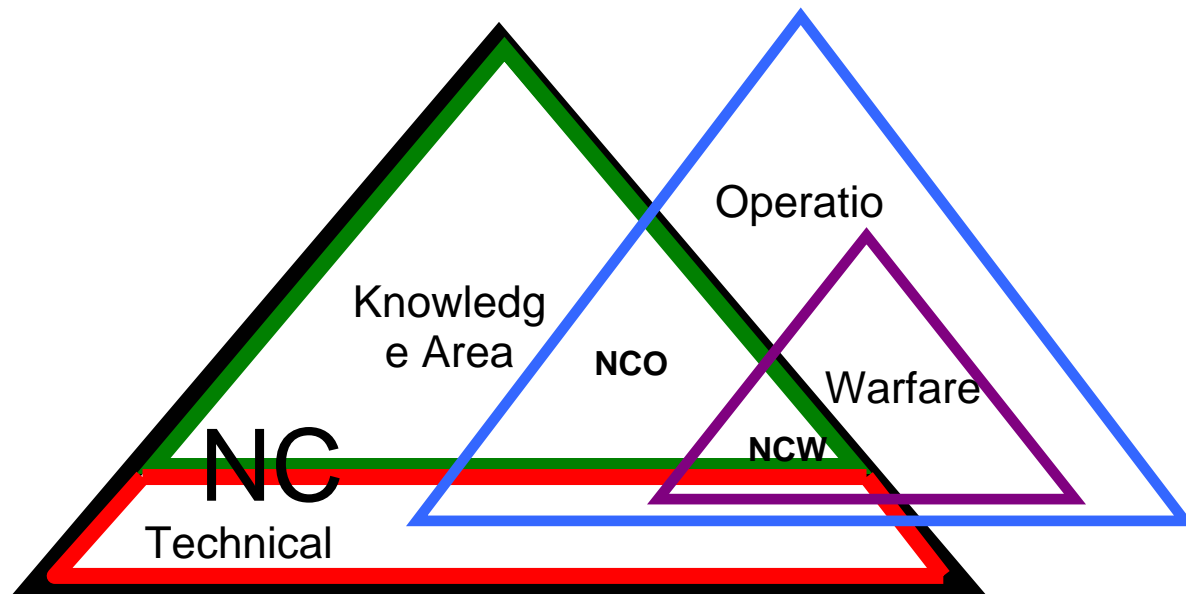


Figure 1. Environment, Operations, Warfare.

NCO and NCW are intended to improve effectiveness and efficiency over the battlefield. According to the *NCE JFC*, operating in a NCE will enable the Joint Force to achieve superior decision-making and apply capabilities effectively, robustly, and flexibly. “These new capabilities will allow forces to be employed in fundamentally different ways by integrating the Joint Force across progressively lower echelons.”¹⁴

With the NCE as an underlying assumption, the intent behind the joint center concept is to centralize campaign planning at a single location, while exploiting the NCE to empower subordinate warfighters during execution. Such an organization would provide the framework for the synergistic effects 21st century US forces require. Ultimately, the joint center concept would mitigate the negative influence of individual services’ parochial interests during the joint fight, and insure that US forces finally achieve the optimum level of economy of force and battlefield effectiveness.

Research Question

Is the Joint Force primed for a transformation to operate under a joint-center construct? What are the doctrinal, organizational, and technological

¹⁴NCE JFC, 1.

impediments to such a center? This thesis will answer these questions in five parts.

Chapter 1 will explore the doctrinal obstacles to the establishment of a joint center. Each service has its own set of doctrinal guidelines in addition to joint doctrine that details how each component plans for and executes contingency operations. Questions to consider here include: is current service doctrine compatible with NCO? If not, then what changes are necessary to make such a transformation?

Chapter 2 will discuss what a joint center might look like. It will address the practicality of the Joint Force operating under such an organization and how a joint center would align for operations within a NCE. This chapter will then propose a future joint center concept for the Joint Force. It will discuss the organization of a joint center as well as its role during the joint fight in a NCE.

Chapter 3 will conceptualize the NCE and explore socio-cultural and organizational barriers to net-centric operations.

Chapter 4 will delve into the technology associated with the NCE and a joint center. Specifically, what technological advances are needed to enable a network-based joint planning effort? More importantly, what developments in infrastructure, equipment, and software are necessary to build the network upon which a joint center would be based?

The concluding chapter will address the potential pitfalls associated with a NCE-based joint center. It will close by discussing how congruent today's US military service cultures are with the NCE and the joint-center concept.

In the end, this thesis will illustrate that the joint center is an organizational mechanism through which the US military can become markedly more efficient in order to meet the challenges of the 21st century and 'do more with less.'

Chapter 1

Doctrine, Command and Control, and the Joint Center

“The only satisfactory method of ensuring unity of effort lies in due preparation of the minds of the various commanders, both chief and subordinate, before the outbreak of hostilities. Such preparation comprehends not only adequate tactical and strategic study and training, but also a common meeting ground of beliefs as to the manner of applying principles to modern war.”

LCDR Dudley W. Knox, USN
“The Role of Doctrine in Naval Warfare”
U.S. Naval Institute Proceedings, 1915

Three generally accepted types of doctrine govern military activity: fundamental doctrine, environmental doctrine, and organizational doctrine. Each of these defines the approach the military takes to operations at differing levels of warfare. See Figure 2.

Fundamental doctrine lays the foundation for all other types of doctrine. Fundamental doctrine defines the nature of war, the purpose of military forces, and the relationship of military force to other instruments of power.¹⁵

Environmental doctrine is a step below fundamental doctrine. “It is narrower in scope than fundamental doctrine because it deals with the exercise of military power in a particular medium” (land, water, space, and so on).¹⁶

Organizational doctrine is the next step below environmental doctrine. It encompasses basic beliefs about the operation of a particular military organization. Organizational doctrine is narrow in scope and must change to stay current. Organizational doctrine contrasts with the other types of doctrine in its frequency of change. Fundamental doctrine and environment doctrine change not at all or very slowly over time.¹⁷

¹⁵Col (ret) Dennis Drew and Don Snow, *Making Strategy: An Introduction to National Security Processes and Problems*, (Maxwell AFB, Ala.: Air University Press, 1988), 168.

¹⁶Drew, 169.

¹⁷Drew, 170.

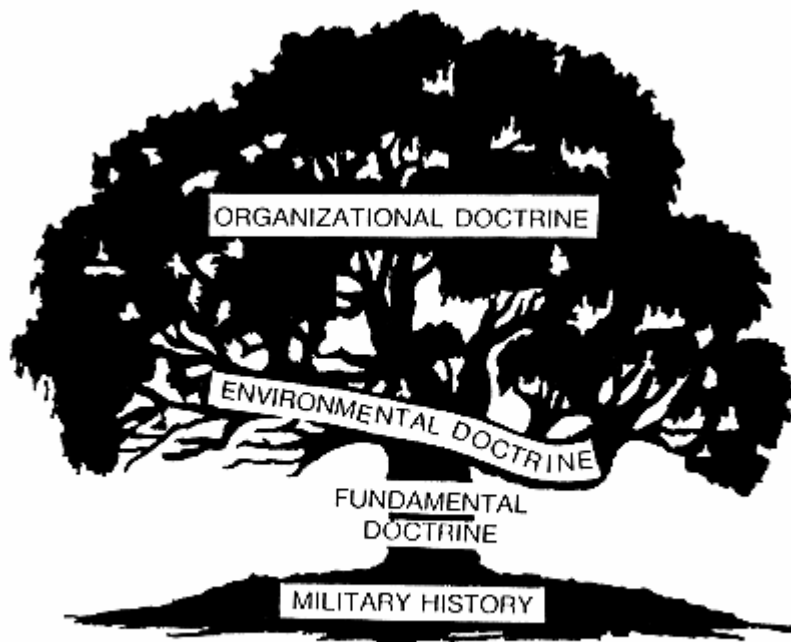


Figure 2. Doctrine

US military doctrine is primarily organizational in nature.¹⁸ This chapter will examine US military doctrine from an organizational standpoint. The objective of this chapter is to examine the doctrinal foundations of the individual military services and the doctrine under which they employ forces together. Beginning with an overview of US military joint doctrine, a comparative analysis will then highlight the doctrinal differences between the individual components, to include each service's preferred C2 methods, which potentially serve as impediments to the formation of a joint center commanding and controlling a joint fight.

What Is Doctrine?

The American Heritage Dictionary defines doctrine as “something that is taught; a principle or body or principles presented for acceptance or belief...”¹⁹

¹⁸Drew, 170.

¹⁹*The American Heritage Dictionary*, 2nd ed (Boston: Houghton Mifflin Company, 1982), 414.

These principles are intended to form the foundation upon which a military determines strategy and ultimately influences its battlefield execution. Col (ret) Dennis Drew in *Military Doctrine* discusses the significance of doctrine as it pertains to military affairs while at the same time highlighting its baffling character.

“Doctrine has, or should have, an extraordinary impact on the strategy process, and doctrine is an ill-defined, poorly understood, and often confusing subject in spite of its considerable importance.”²⁰

Doctrine is an important part of how the military conducts operations. Perhaps because of this, doctrine and its application to campaigns is so contentious.

US Joint Doctrine

The fundamental purpose of the Armed Forces is to win the nation’s wars.²¹ According to the *Joint Doctrine Capstone and Keystone Primer* (JDCKP), “Military doctrine presents fundamental principles that guide the employment of forces...Doctrine shapes the way the Armed Forces think about the use of the military instrument of national power.”²²

Joint doctrine also mandates that the JFC structure a joint organization in such a way as to facilitate inter-service interaction and integration. According to JP 3-0, “The goal is to increase the total effectiveness of the joint force, not necessarily to involve all forces or to involve all forces equally.”²³

In order for this integration and synchronization to occur, a common vector must permeate the planning efforts of the individual services. Setting this vector is one of the JFC’s primary tasks. Again, according to JP 3-0, “The

²⁰Drew, 163.

²¹*Joint Doctrine Capstone and Keystone Primer (JDCKP)*, 10 September 2001, 1.

²²*JDCKP*, 10 September 2001, 3.

²³Joint Publication (JP) 3-0. *Doctrine for Joint Operations*, 10 September 2001, II-4.

first principle in joint force organization is that JFCs organize forces to accomplish the mission based on the JFCs' vision and concept of operations.”²⁴

There are two problems, however, with this method of planning in today's context. First, there is currently no permanent planning organization through which to implement the JFC's vision and concept of operations.²⁵ Today's method of conducting joint planning is to create a joint planning group (JPG). Much like the JTF, the JPG “is a temporary staff cell that is established at the initial indicators of a contingency. Essentially, the JPG is designed to enhance the crisis action planning (CAP) process.”²⁶ The preponderance of the planning, however, occurs at the component level.²⁷

Second, there is no all-encompassing mechanism with which to exercise command over forces in the field or to monitor the progress of an operation. The service components' HQs, using service doctrine, exercise C2 in their own way. In essence, the services each execute their own separate campaign planning and C2, nearly in isolation from one another. The joint center could alleviate this isolation, but are the services configured for centralized planning and command of operations?

If real integration and synchronization are to occur, doctrine across the services must be generally similar, with some specialization to meet the needs of each specific component. That is not the case. At the most basic level, there are significant differences in US service doctrine.

US Army

The Army was the first US military service to codify its methods and to place an emphasis on doctrine. The Army's specific roles and missions, coupled with its long-standing history and experience with doctrine, give it a unique perspective on the role of doctrine in both campaign planning and

²⁴JP 3-0. *Doctrine for Joint Operations*, 10 September 2001, II-12.

²⁵The Standing Joint Force Headquarters is scheduled to stand-up in fiscal year 2005.

²⁶“Joint Planning Group,” *Federation of American Scientists*, 12 May 1999, n.p., on-line, Internet, 30 May 2005, available from <http://www.fas.org/man/dod-101/army/unit/docs/cdd/crisis.htm#Tactical%20Tasks>.

²⁷“Joint Planning Group.”

operational execution. Although specifying that it is not prescriptive, Army doctrine is arguably very detailed, scripted, and regulatory. Field Manual (FM) 1, *The Army*, hints at Army doctrine's prescriptive flavor. "Army doctrine is detailed enough to guide operations, yet flexible enough to allow commanders to exercise initiative when dealing with specific tactical and operational situations."²⁸

Other Army doctrinal publications provide a 'cookbook' approach that is close to prescriptive in nature. For example, FM 3-0, *Operations*, gives a detailed description of the thought process to go through prior to executing an operation.²⁹ The METT-TC mission planning process provides the necessary 'ingredients' to enable a well-thought-out plan and decision.³⁰ Even further, FM 3-0 describes in detail the different forms of maneuver and types of operations. More to the point, FM 3-0 provides guidance about planning considerations, preparing for operations, and execution of operations.³¹ This sort of doctrine is much like a tactics manual.

At the other end of the spectrum, however, the Army philosophizes about its focus on an initiative-based force. Army doctrine addresses at length its method of C2: mission orders and mission command.

Mission orders are the bedrock of Army C2. According to FM 5-0:

"Commanders are responsible for planning (emphasis in original). Their knowledge, experience, and personality...drives the planning process...[C]ommanders play a central role in planning through their commander's intent, CCIR [commander's critical information requirements], and planning guidance.

Effective planning incorporates the concept of mission command (emphasis in original). Mission command, the Army's preferred C2 concept, concentrates on the objective of an operation and not on every detail of how to achieve that objective. Successful mission

²⁸Field Manual (FM) 3-0. *Operations*, June 2001, 1-14.

²⁹FM 3-0, 7-23.

³⁰METT-TC refers to factors that are fundamental to assessing and visualizing: Mission, Enemy, Terrain and weather, Troops and support available, Time available, and Civil considerations (FM 3-0, 5-3).

³¹FM 3-0, 7-3.

command results in subordinate leaders at all echelons exercising disciplined initiative within the commander's intent..."³²

The nature of ground combat and current technological limitations may preclude more intrusive C2 methods, but clearly the Army contends that a decentralized decision-making process is more conducive to dealing with the fog and friction of war than does a centralized one. Mission command and mission orders are the method the Army doctrinally espouses to handle uncertainty on the battlefield.

In order for this method to be effective, however, the Army also recognizes the importance of grooming competent decision-makers at the lowest levels. The Army espouses six core competencies, which define its fundamental contributions to national security. The common link throughout each of these competencies is the individual soldier. The Army focuses the preponderance of its doctrine, organization, and even technology on empowering the individual soldier in the field. As a result of this philosophy, the Army focuses much of its energies on training the individual to make correct decisions. According to FM 1, the "future...demands increasing levels of judgment, agility, self-awareness, adaptiveness, and innovation from leaders."³³

As such, the Army goes to great lengths to encourage individual initiative and, to some extent, creativity in its doctrine. According to FM 3-0, "Initiative requires delegating decision making authority to the lowest practical level...Such decentralization frees commanders to focus on the critical aspects of the overall operation."³⁴

Within the Army, the commander's intent carries a lot of weight and significance in the realm of mission command. The commander's intent communicates the boundaries within which the subordinate leader and individual soldiers have freedom to operate. This does not mean individual

³²FM 5-0. *Army Planning and Orders Production*, January 2005, vii.

³³FM 1, 29.

³⁴FM 3-0, 4-15.

soldiers have no latitude of action. The nature of ground combat is a driving force between decentralization and commensurate mission command. According to FM 3-0, “Using mission-type orders requires individual initiative...It also requires leaders who trust their subordinates and are willing to take and underwrite risks.”³⁵

Army doctrine portrays C2 in a manner similar to that described in joint doctrine. FM 3-0 describes C2 as “the exercise of authority and direction by a...commander over...forces in the accomplishment of the mission...Through C2, commanders initiate and integrate all military functions...toward a common goal: mission accomplishment.”³⁶

Technology and communication equipment are C2 enablers, not to be misconstrued for C2 in and of itself. The Army is not, however, ignorant of the fact that evolving technological developments can and will impact its C2 methods. Technology still serves as an enabling force for the Army commander and soldier in the field. According to FM 3-0, “Information technology allows commanders and subordinates to share a COP [common operational picture] tailored to each echelon...Situational understanding, supported by the COP, allows commanders to synchronize their forces effectively and make rapid adjustments as the situation changes.”³⁷

Doctrinally, the Army fails to address the integration and synergistic effect joint doctrine mandates. This may stem from the fact that the Army is historically the supported command and has accepted little responsibility for Joint Force integration. As the ‘main effort,’ it is conceivable that the Army sees deconfliction and integration as the responsibility of the supporting elements. With that in mind, then, are Army doctrine and C2 methods compatible with the proposed joint center concept? The Army’s inattention to synergy and integration may suggest not, while its insistence on decentralized C2 of execution may pose problems as well.

³⁵FM 3-0, 4-16.

³⁶FM 3-0, 5-17.

³⁷FM 3-0, 7-28.

US Navy

The nature of modern naval warfare requires a degree of independence and latitude that makes the US Navy unique among the armed services. According to NDP 1, “Naval expeditionary forces draw upon their readiness, flexibility, self-sustainability, and mobility to provide the National Command Authorities the tools they need to safeguard...vital national interests.”³⁸ For the Navy’s influence to be commensurate with established national policy and direction, however, the sea service requires doctrine tailored to facilitate such operations.

Unlike the Army, Navy doctrine serves as a guide, not as a ‘cookbook’ to follow. Naval Doctrine Publication (NDP) 1, *Naval Warfare*, implies that Navy doctrine is a way of thinking, not an instruction manual. According to NDP 1, “Doctrine is the heart of naval warfare. It governs our actions beyond the ordered execution of military operations, but is not prescriptive...It is not a set of concrete rules, but rather a basis of common understanding throughout the chain of command.”³⁹

From the standpoint of operational application, Navy doctrine revolves around two primary concepts: unity of effort and decentralization. Oddly enough, these two concepts appear to pull the service in opposite directions. On the one hand, unity of effort involves focusing friendly forces and resources toward a common goal in concerted fashion. Decentralization, on the other hand, is more akin to a piecemeal approach to dealing with an enemy. The Navy reconciles this difference in a similar manner to that of the Army, through commander’s intent and mission orders.

Unity of effort is a central concept in Navy doctrine.⁴⁰ In order to facilitate unity of effort at the tactical level of war, the Navy relies on the commander’s intent in the same manner as does the Army in order to reconcile

³⁸NDP 1, 8.

³⁹Naval Doctrine Publication (NDP) 1. *Naval Warfare*, 28 March 1994, 51.

⁴⁰NDP 1, 37.

the dichotomy between unity of effort and decentralization.⁴¹ The Navy uses the commander's intent as a vector, which communicates both the plan and the desired end state.⁴² Accordingly, the Navy issues and operates under mission orders:

“Mission-type orders define the contract that the commander's intent establishes between the delegating commander and his subordinates...Effective commanders at all levels neither expect nor attempt to control every action of their subordinates. Nor do they profess to foresee or attempt to plan for each contingency.”⁴³

Navy doctrine emphasizes the human side of C2 rather than its technological components. According to NDP 6, “Modern technology has broadened the scope and increased the complexity of command and control, but its foundations remain constant: professional leadership, competence born of a high level of training, flexibility in organization and equipment, and cohesive doctrine.”⁴⁴

In line with the Army's C2 approach and its emphasis on initiative, the Navy operates under what it calls mission control and decentralized decision-making and execution. Senior Navy commanders assign missions and explain intent, but leave subordinates free to choose the means and manner of accomplishing the task.⁴⁵ “Mission control thus seeks to capitalize on the initiative of subordinates to speed up the pace of our decision and execution cycle to achieve and maintain unity of effort and a rapid tempo of operations.”⁴⁶

How, then, does Navy doctrine align with joint doctrine? Like the Army, Navy doctrine does little to address joint integration and synchronization. However, Navy doctrine's emphasis on planning and unity of effort are certainly conducive by extension to the same at the joint level. Navy concepts of decentralized command of execution may, like the Army's, prove problematic for a joint center.

⁴¹NDP 1, 38.

⁴²NDP 1, 39.

⁴³NDP 1, 39.

⁴⁴NDP 6. *Naval Command and Control*, 19 May 1995, ii.

⁴⁵NDP 6, 52.

⁴⁶NDP 6, 52.

US Marine Corps

The USMC, like the Navy, advocates an authoritative, but not prescriptive, approach to service doctrine.⁴⁷ Marine Corps doctrine addresses the difficulty of maintaining centralized control on a chaotic battlefield. In fact, USMC doctrine highlights the need to exploit this uncertain environment, espousing decentralization as the means to contend with the uncertainties of war.⁴⁸

The bedrock of USMC organization, employment, and C2 is a philosophy of command, highly congruent with its method of warfare. The Marine method of maneuver warfare relies on individual initiative and demands rapid, timely decision-making in the field. As such, the USMC philosophy of command requires an implicit trust in its subordinate leaders, which empowers them to make decisions. “Subordinate commanders must make decisions on their own initiative,” according to MCDP 1, “based on their understanding of their senior’s intent, rather than passing information up the chain of command and waiting for the decision to be passed down...”⁴⁹ The USMC philosophy, of course, requires competent leaders at all levels. MCDP 1 declares that the Marine “decentralized system requires leaders at all levels to demonstrate sound and timely judgment. Initiative becomes an essential condition of competence among commanders.”⁵⁰

Similar in intent to the mission-orders concept used by the Army and Navy, the USMC also uses mission tactics to relinquish significant decision-making authority to subordinate commanders and Marines. MCDP 1 describes mission tactics as “assigning a subordinate mission without specifying how the mission must be accomplished.”⁵¹

⁴⁷Marine Corps Doctrine Publication (MCDP) 1. *Warfighting*, 20 June 1997, 56.

⁴⁸MCDP 1, 71.

⁴⁹MCDP 1, 77.

⁵⁰MCDP 1, 81.

⁵¹MCDP 1, 87.

The USMC also uses the commander's-intent concept to communicate with subordinate leaders and to empower them to make educated and appropriate decisions. Marine doctrine seeks to achieve individual initiative and lateral coordination "through the use of the commander's intent, a device designed to help subordinates understand the larger context of their actions."⁵²

MCDP 1-0, *Marine Corps Operations*, describes C2 as "the exercise of authority and direction over assigned and attached forces in the accomplishment of a mission."⁵³ In more specific terms, however, USMC doctrine distinguishes command from control and further breaks down command into two key subcomponents: decision-making and leadership. According to MCDP 1-0, "Command remains a very personal function...The focus of command and control is on the commander—his intent, guidance, and decisions and how he receives feedback on the results of his actions..."⁵⁴

Control is an enabling function to facilitate the commander's command function. "Control allows the staff to monitor the status of the command, assess the gap between what was planned and what has been accomplished..."⁵⁵

The USMC analyzes subordinate decision-making. MCDP 1-0 discusses the breakout of decision-making and leadership. In essence, decision-making entails choosing whether to act and, if so, how to assess the effects of the choices the subordinate leader makes."⁵⁶

The USMC organizes and executes C2 over its forces with an eye toward letting the individual exercise initiative. Mission orders, decentralized decision-making and commander's intent are the key aspects to USMC C2.

Like the Army and Navy, USMC doctrine does not address integration or synchronization. The Corps mirrors the Army and Navy in its approach to

⁵²MCDP 1, 88.

⁵³MCDP 1-0. *Marine Corps Operations*, 27 September 2001, A-1.

⁵⁴MCDP 1-0, A-1

⁵⁵MCDP 1-0, A-1.

⁵⁶MCDP 1-0, A-1.

command-and-control of execution and may have difficulty responding to centralized command from a joint center.

US Air Force

In some respects, Army, Navy and Marine doctrine and C2 methods are similar. The USAF, however, follows a significantly different path. While acknowledging the legitimacy of history and the value of lessons learned, the USAF considers doctrine to be a general guide, not a recipe for success. According to AFDD 1, “good doctrine is somewhat akin to a good ‘commander’s intent’: it provides sufficient information on what to do, but does not specifically say how to do it.”⁵⁷

USAF doctrine differs significantly from the other services in its treatment of battlefield operations. Whereas the other components stress the importance of mission orders and commander’s intent, USAF doctrine mentions commander’s intent only in passing. The only discussion in overarching USAF doctrine is one line in AFDD 1: “Commanders should rely on delegation of authorities and commander’s intent as methods to control forces.”⁵⁸ This stands in contrast to the rest of the Joint Force’s approach to C2.

The USAF, unlike the other services, organizes and exercises C2 over its forces by focusing on technology and equipment, not people. While individual airmen themselves are important in the USAF, the nature of airpower and its traditional employment connotes an emphasis on advanced technology—sometimes at the expense of the individual airman in terms of latitude and initiative over the battlefield.

The USAF addresses its method of C2 under the mantra of centralized control and decentralized execution. “Because of air and space power’s unique potential to directly affect the strategic and operational levels of war, it must be controlled by a single airman who maintains the broad, strategic perspective

⁵⁷Air Force Doctrine Document (AFDD) 1. *Air Force Basic Doctrine*, 17 November 2003, 3.

⁵⁸AFDD 1, 49.

necessary to balance and prioritize the use of a powerful, highly desired yet limited force.”⁵⁹

USAF doctrine, however, does recognize the potential frailties of its C2 approach as technology evolves. Technological advances enable commanders and staffs hundreds of miles removed from the battlefield to manipulate real-time events over the battlefield. According to AFDD 1, “Despite impressive gains in data exploitation and automated decision aids...execution should be decentralized within a command and control architecture that exploits the ability of strike package leaders...during complex, rapidly unfolding operations.”⁶⁰

There is recent historical precedent to validate this declaration in Operation Deliberate Force, OAF, OEF, and OIF. Ultimately, centralized control and centralized execution is becoming easier to achieve as technology develops, and the USAF appears to embrace this ability despite its stated doctrine. Regarding C2, the rhetoric and reality of USAF doctrine appear at odds. This trend toward centralization stands in stark contrast to that of the other services.

There is a reason for this apparent difference, however. Army, Navy, and Marine doctrine seems to emphasize decentralization aimed at the subordinate commander in the field. This is quite clear, considering the significance each service puts on mission orders and commander’s intent. USAF doctrine, however, does not. The USAF approach to decentralization appears to rest with the JFACC at the Air Operations Center (AOC), not with the flight leads and mission commanders. This is obviously a significant difference. While the doctrine may appear to be similar at first, in practice, the USAF approach to planning and C2 is markedly different.

USAF doctrine advocates *centralized control/decentralized execution* as being critical to the effective employment of air and space power. This tenet is

⁵⁹AFDD 1, 28.

⁶⁰AFDD 1, 29.

“the fundamental organizing principle for air and space power.”⁶¹ Air Force Doctrine Document 1 defines “centralized control as the planning, direction, prioritization, synchronization, integration, and deconfliction of air and space capabilities.”⁶² Decentralized execution, on the other hand, is the “delegation of execution authority to responsible and capable lower-level commanders to achieve effective span of control and to foster disciplined initiative, situational responsiveness, and tactical flexibility. It allows subordinates to exploit opportunities in rapidly changing, fluid situations.”⁶³ In theory, this tenet is commensurate with operations in a NCE. In practice, however, this does not seem to be the case as the following will illustrate.

The manner in which the USAF conducted Operation Allied Force, for example, shows the increasingly centralized nature in which the Combined Air Operations Center (CAOC) can and does become mired in real-time, tactical events. One well-known case of this involved the Combined Force Air Component Commander (CFACC), in response to direction from the Supreme Allied Commander Europe (SACEUR), ordering and then monitoring a target-area talk-on to an airborne forward air controller (FAC-A) over the battlefield.

The CAOC at Vicenza, Italy had live video from a Predator Unmanned Aerial Vehicle (UAV) of three Serbian tanks moving down a road in Kosovo. That video was also broadcast to SACEUR, General Wesley Clark, sitting hundreds of miles away at European Command (EUCOM) HQ in Stuttgart, Germany. SACEUR directed the CFACC, Lieutenant General Mike Short, to have the tanks struck. Gen Short then directed the CAOC to order an aircraft in the vicinity to locate and destroy the tanks. The CAOC attempted to conduct a ‘visual talk-on’ with a FAC-A using the Predator video as a visual reference. Unfortunately, though, the talk-on was unsuccessful and the tanks escaped.

The point, however, is not that the talk-on failed. A video-based, ‘visual talk-on’ is a difficult task. The issue is that a 3-star general at the CAOC was

⁶¹AFDD 1, 33.

⁶²AFDD 1, 33.

⁶³AFDD 1, 34.

involved in the day-to-day tactical minutia of finding targets and executing attacks on those targets. Even worse, a 4-star general was directing actions of that sort from his desk at a combatant command HQ. Clearly, it would seem, this is not decentralized execution as espoused in USAF doctrine.

In terms of joint doctrine, the USAF does specifically address the mandate for synergy and integration, while the other services do not. USAF doctrine aligns with the JDCKP and JP 3-0 in maximizing the Joint Force's capabilities on the battlefield in order to achieve effects whose sum is greater than the individual components. According to AFDD 1, "True integration of effort cannot be achieved by merely carving up the battlespace. While segregation may have some benefit and may appear the simplest way, from a command and control viewpoint, to manage elements of a diverse joint force, it may actually suboptimize the overall effort."⁶⁴

This point of view seems to be an affront to the ground commander who attempts to maintain positive control of supporting fires through fire support coordination measures (FSCM). For airmen, the more restrictive the FSCMs are, the less effective the USAF becomes over the battlefield. The USAF wants doctrine that does not 'tie its hands.' From the USAF perspective, the Army attempts to do just that.

For example, according to Colonel Robert D. Harvey, Kuwait - Air Component Coordination Element (K-ACCE) Deputy Director, the sense within the K-ACCE was that the FSCL was too far forward during OIF. To him, a desire to "maintain control and latitude in operations" drove the placement of the FSCL.⁶⁵ Doctrinally, the Army employs its AH-64 Apaches short of the FSCL, so a deep FSCL allows them to maintain the aforementioned control and latitude.⁶⁶

USAF doctrine makes a similar argument pertaining to supporting fires and component synchronization. The USAF advocates integration, which also

⁶⁴AFDD 1, 6.

⁶⁵Col Robert D. Harvey, Deputy Director Operation Iraqi Freedom Kuwait Air Component Coordination Element, Washington, D.C., interviewed by author, 27 March 2005.

⁶⁶Harvey interview.

marries nicely with joint doctrine. According to AFDD 1, “Synchronization is, in essence, deconfliction in time and space between different units. It is a useful means to plan and execute operations and to prevent fratricide...However, it doesn’t scale up to the operational level and hence is not the best means for achieving the maximum potential of a joint force.”⁶⁷

From a C2 perspective, the nature of airpower lends itself to focusing at the operational level of war. The USAF portrays itself as operating primarily above the tactical level of warfare, and seven of the USAF’s tenets of air and space power address applicability to theater-level events to one degree or another. This begs the question: What mechanism best manages the tactical application of airpower from the operational level? The answer for the USAF is the AOC.

The AOC is the “appropriate command and control mechanism”⁶⁸ through which the Commander Air Force Forces (COMAFFOR) exercises “operational control and Service control.”⁶⁹ The AOC “is the aerospace operations planning and execution focal point for the JTF and is where centralized planning, direction, control, and coordination of aerospace operations occur...”⁷⁰

At the macro level, then, USAF doctrine appears to comply with current joint doctrine. More so than in other services’ doctrine, synergy and integration are key elements of USAF doctrine, and a penchant for centralized command of execution raises possibilities for C2 from a joint center.

Conclusion

Doctrinally, all four services appear to comply with the intent of joint doctrine. But the USAF is the single service that explicitly advocates integration with the other services to achieve a synergistic effect on the

⁶⁷AFDD 1, 6.

⁶⁸AFDD 1, 60.

⁶⁹AFDD 1, 60.

⁷⁰AFDD 2, *Organization and Employment of Aerospace Power*, 17 February 2000, 71.

battlefield. The doctrine of the remaining services focuses inward, perhaps due to the nature of surface and naval warfare.

From the perspective of a joint center, though, the doctrine of all four services is insufficient for true integrated operations. While the Army, Navy, and USMC espouse decentralization and empowered subordinate leaders, each fails adequately to address integration and synchronization. USAF doctrine, on the other hand, thoroughly discusses the importance of synchronization, yet its approach to decentralization may be radically different. This could be beneficial for a joint center, but problematic in a net-centric environment. Reconciling these differences may be crucial to successful implementation of a joint center.

Chapter 2

A Joint Planning and Monitoring Center

“We are working to promote a culture that rewards unconventional thinking—a climate where people have freedom and flexibility to take risks and try new things...one that does not wait for threats to emerge and be "validated," but rather anticipates them before they emerge—and develops and deploys new capabilities quickly, to dissuade and deter those threats.”

Secretary Rumsfeld
February 5, 2003

The previous chapter illustrated the doctrinal differences and similarities between the services. With that as a starting point, this chapter will seek to address whether a joint center is a feasible concept for the Joint Force. To do that, it will begin by describing the joint center in today's terms. Next, it will attempt to reconcile service doctrine with the joint-center concept. Finally, this chapter will assess the viability and applicability of a joint center in a NCE.

A Joint C2 Center

The notion of a center suggests centralized decision-making, thereby reducing or even eliminating individual initiative and decision-making authority. Moreover, the idea of a center requires a degree of omniscience in order to facilitate effective real-time tasking and decision making. With these considerations in mind, could a joint center plan, command, and exercise control over the Joint Force?

There are two main organizational issues that might serve as impediments to a joint C2 center. The first is the doctrine and corresponding organization of the services. The second is the ability of the services to transform to operate in a NCE. These two considerations will ultimately decide whether the Joint Force can embrace a joint center of some sort.

The organizational makeup of the US armed forces correlates with how individual services plan, execute, and command their forces in the field. As

expected, this organizational structure is derived from individual service doctrine. The Army, Navy, and Marines advocate decentralization via concepts commensurate with commander's intent and mission orders, ultimately relying on subordinate commanders to make time-critical decisions. The USAF, however, operates somewhat differently under the concept of centralized control and decentralized execution via the JFACC and the AOC. How compatible, then, are the services with operating under a joint center?

As discussed in the previous chapter, it is apparent that Army doctrine is not in alignment with the concept of a joint center. Army culture is one of subordinate empowerment and decentralized decision making which is naturally resistant to centralized control. In addition, the Army is neither configured for nor accustomed to receiving direct tasking from a centralized HQ. A centralized command center issuing real-time orders and making centralized decisions is counter to Army tradition. From doctrinal and organizational standpoints, then, a joint C2 center is compatible with neither Army doctrine nor its C2 methods.

Like the Army, the Navy's emphasis on mission control and decentralized decision-making and execution is contrary to a joint-C2-center concept. In addition, the nature of naval operations seems to require a degree of individual initiative. Naval units are also unaccustomed to real-time, higher-HQ tasking. Ultimately, the way the Navy operates is incompatible with a joint center.

USMC culture is also incompatible with the centralized-command-center concept. Marines are accustomed to mission orders and decentralized decision-making guided by commander's intent, which stands in stark contrast to the centralization implied by a joint center.

The USAF is the only component with the doctrine and a tradition of C2 methods congruent with a joint center that would exercise C2. As such, the current manner in which airpower is tasked, employed, and controlled aligns well with a centralized command center.

With the exception of the USAF, then, the Joint Force is incompatible with operating subordinate to a joint center. With that in mind, it makes little

sense to create a centralized C2 mechanism that contradicts the current strengths of the preponderance of the components, unless there are large gains to be had from the transformation elsewhere. Are large gains available through the creation of a joint center operating in a NCE?

The Net-Centric Environment

The emerging 21st century operational environment demands a flexible and agile force prepared to deal with both a symmetric and an asymmetric adversary. As OEF and OIF have already begun to demonstrate,

“Future operations will be non-linear in space, time, and intensity...Without lines, even the notions of front, rear, and flanks have little meaning. Non-linearity in *time* means that operations need not be undertaken sequentially... Operational pauses will be rare. This brings into question the value of synchronization in the battlespace—‘the ability to focus resources and activities in time and space to produce maximum relative combat power at the decisive point’-- for that concept is inherently linear. Non-linearity in *intensity* means that small actions can have very great, disproportionate effects.”⁷¹

This new operational environment means, “The current state of human and technical connectivity and interoperability of the Joint Force...are inadequate to achieve the levels of operational effectiveness and efficiency necessary for success in the emerging operational environment.”⁷²

Transforming the Joint Force to operate in this environment spotlights speed of command. “Speed of command is the process by which a superior information position is turned into a competitive advantage.”⁷³ In this emerging environment, how does one achieve superiority in speed of command? Speed of command is facilitated by self-synchronization. In the future battlespace the increased use of deception, surprise, the rapidity with which targets can emerge and disappear, and the increasing preponderance of

⁷¹Vice Admiral Arthur K. Cebrowski, “Network-centric Warfare: An Emerging Military Response to the Information Age,” address to the 1999 Command and Control Research and Technology Symposium, 29 June 1999, n.p., on-line, Internet, 7 June 2005, available from http://www.nwc.navy.mil/pres/speeches/ccrp2_.htm.

⁷²NCE JFC, 9.

⁷³Cebrowski.

time-sensitive-targets (TST) illustrate the value of self-synchronization. This means that lower-echelon military forces, empowered with high situational awareness and decision-making authority, will be able to recognize and act on a situation without further direction.⁷⁴

In order to deal with this environment and improve speed of command, then, operations in a NCE will be different than current operations. There will be fewer defined boundaries within military organizations. Information-sharing and collaboration leading to the development of organizational principles will, in turn, facilitate the transformation of existing capabilities and the development of more effective ones. In a NCE, information is posted to shared spaces and can be accessed by both anticipated and unanticipated users, through loosely-coupled, smart, pull-based architectures. By removing the barriers to the flow of information, the Joint Force will be more integrated and interdependent, which should increase agility and effectiveness.⁷⁵

Current Joint Force integration is largely platform-centric. Individual systems are brought together in a rigidly structured fashion to accomplish a mission. The principles of a platform-centric environment create barriers to the flow of information. As a result, the platform-centric environment tends to have a high level of friction which reduces the potential effectiveness and efficiency of the Joint Force. Inherent difficulties in manipulating these types of systems force the Joint Force to practice coordination and deconfliction measures as opposed to integration.⁷⁶ See Figure 3.

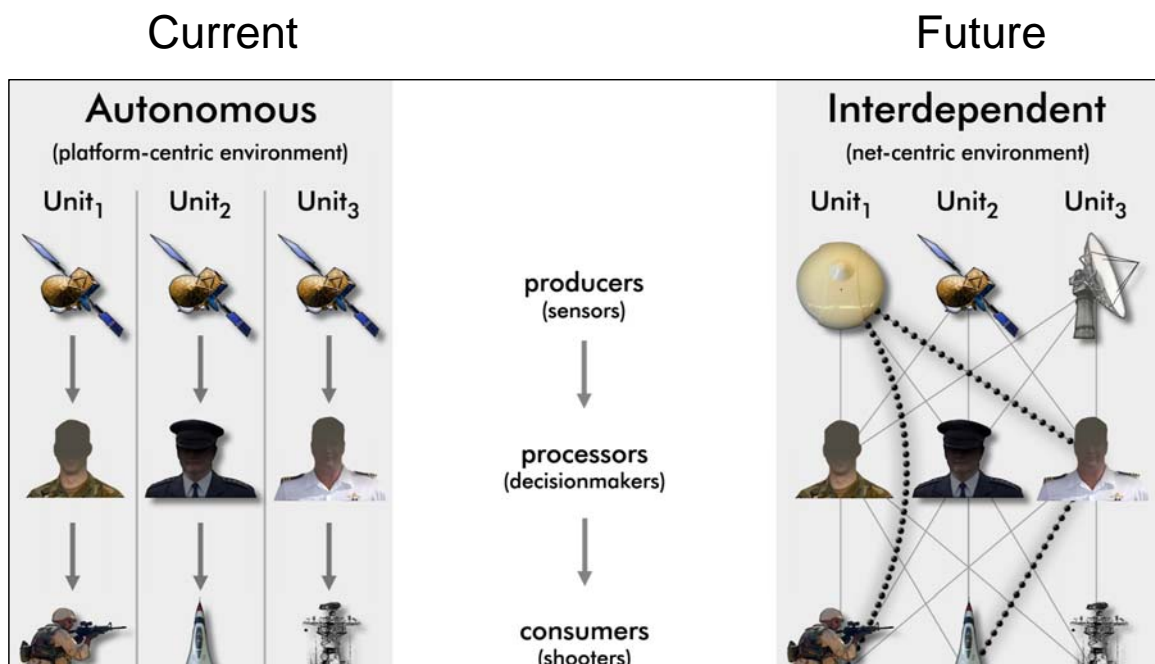


Figure 3. Platform-centric vs. Net-Centric.

The ‘fix’ to this platform-centric approach is to transform to a net-centric approach. The central idea is “if the Joint Force fully exploits both shared knowledge and technical connectivity, then the resulting capabilities will dramatically increase mission effectiveness and efficiency.”⁷⁷ Connectivity allows experts to integrate their perspectives to better interpret situations and problems, identify candidate actions, formulate evaluation criteria, decide what to do, and execute those decisions. In the context of this concept, collaboration is used to share and improve information, awareness, and understanding among the elements of the Joint Force and its mission partners. This, in turn, may well support decision-making and synchronize activities.⁷⁸

The question, then, is whether the NCE as described is compatible with a joint-C2-center concept. The answer is no. Whereas the NCE subscribes to decentralization and information-sharing throughout the force, the joint-C2-center concept hinges on centralization and hierarchy.

What’s the Alternative?

Absent a joint C2 center, the Joint Force needs a single planning organization that is responsible for the planning and execution of the joint fight. Without such an organization, the Joint Force is unlikely to achieve the

⁷⁷NCE JFC, 10.

⁷⁸NCE JFC, 11.

flexibility, synergy, and integration necessary to deal with the emerging threats of the 21st century.

A Joint Planning and Monitoring Center as envisioned in this thesis is a Joint Force campaign planning and monitoring organization 10-20 years in the future.⁷⁹ A JPMC would be positioned in a single location at the JFHQ with the JFC, the component commanders, and their accompanying planning staffs and component HQs. This collocation is needed for face-to-face interaction throughout the planning and execution phases of an operation. Such a concentration of high-level C2 assets raises questions about security and force protection. Few could dispute the JPMC as a lucrative target. This issue can be overcome, however, in a number of ways. One option is to protect the HQs in much the same way the Joint Force protects its airfields today. In fact, this consolidated HQ location might simplify the Area Air Defense Commander's (AADC) task in the AOR. A second option is to geographically separate the JPMC sufficiently from the area of operations (AOR) so as to minimize the associated risks. A third option is for the component HQs to conduct collaborative planning from distributed, geographically separated locations much like those of today.

Advances in communications technology might obviate the need for direct interpersonal contact, but this has yet to prove accurate. The contemporary video teleconference (VTC) and similar communications capabilities fail to achieve the same effects as do face-to-face interaction. "Studies indicate that virtual teams have less overlap in their representation of the (shared) task and are less cohesive than collocated teams...In addition, virtual team members often have cultural differences and their lack of a shared history can negatively affect the team's ability to develop a sense of trust, impacting the team's ability to accomplish its mission."⁸⁰ Until such time as

⁷⁹The timeline for fielding a JPMC is based on the time required to develop and field the NCE as well as to adapt the Joint Force to operating in the NCE. The NCE JFC is predicated on this 10-20 year timeline.

⁸⁰Julia Loughran, "Working Together Virtually: The Care and Feeding of Global Virtual Teams," *Thoughtlink.com*, n.p., on-line, Internet, 23 May 2005, available from <http://www.thoughtlink.com/publications/TLL-ICCRTS00/paper/TLL-ICCRTS00.doc>.

VTC-like communication tools can achieve the same social benefits of meeting face-to-face, virtual interaction at the command level will remain less than ideal.

The current method of dealing with this absence of face-to-face interaction to facilitate joint planning is via liaison officers and staffs. The Kuwait-Air Component Coordination Element (K-ACCE) during OIF is the most recent and high-profile example of using a liaison to mitigate this limitation. The CFACC dispatched the K-ACCE to the Combined Force Land Component Commander (CFLCC) HQ in Kuwait to serve as his liaison.

Then-Major General Dan Leaf, accompanied by a core of 10 officers and two enlisted personnel, deployed to Camp Doha, Kuwait, to serve as the CFACC's direct link into the land component at the start of OIF.⁸¹ According to the After Action Report, the K-ACCE provided the air component two principal advantages: presence in the land component's HQ and activities, and the unique perspective that presence provided. For Leaf, "Simply being present 'in the game' diffused many issues before they became stumbling blocks to joint operations."⁸² As Army plans and opinions developed, the K-ACCE could convey the air perspective to the land component's personnel with greater clarity and understanding than an email, briefing, or phone call could provide. The K-ACCE was able to provide this air perspective to the land component without circumventing the Battlefield Coordination Detachment (BCD) located at the AOC. In fact, the K-ACCE often referred the land component's questions to the BCD in order to exercise the proper processes and communication channels.⁸³

Since the end of the war in Iraq, the USAF has gone to great lengths to champion the value of the K-ACCE during OIF. A JPMC, however, would obviate the need for such a liaison while retaining the clear benefits such a liaison provided to the CFC in OIF.

⁸¹Leaf, Lt Gen Dan. *Kuwait CFLCC Air Component Coordination Element Operation Iraqi Freedom After Action Report*. 2005, 4.

⁸²Leaf, 4.

⁸³Leaf, 5.

What, then, would a JPMC look like?

The Joint Planning and Monitoring Center

A JPMC would emulate the JFACC's current AOC concept, but on a larger scale. As envisioned in this thesis, the JPMC would be the 'brain' within which the campaign plan is conceived, planned, and monitored during execution. From an organizational standpoint, the JFC would sit at the center of a JPMC with each component commander around the edges. This type of organization, of course, is contrary to how US military forces organize today.

Figure 4 is a notional depiction of how US forces currently organize for employment. This traditional hierarchical command structure is not conducive to information access and information sharing. The 'bottleneck' is in the decision-making process, which traditionally occurs at the JFC level. In essence, "all information intended for subordinates is recognized as belonging to and flowing through the hierarchy."⁸⁴ The hierarchy ultimately serves as a tool for controlling information, which is cumbersome and slow in terms of sharing the information throughout the organization.

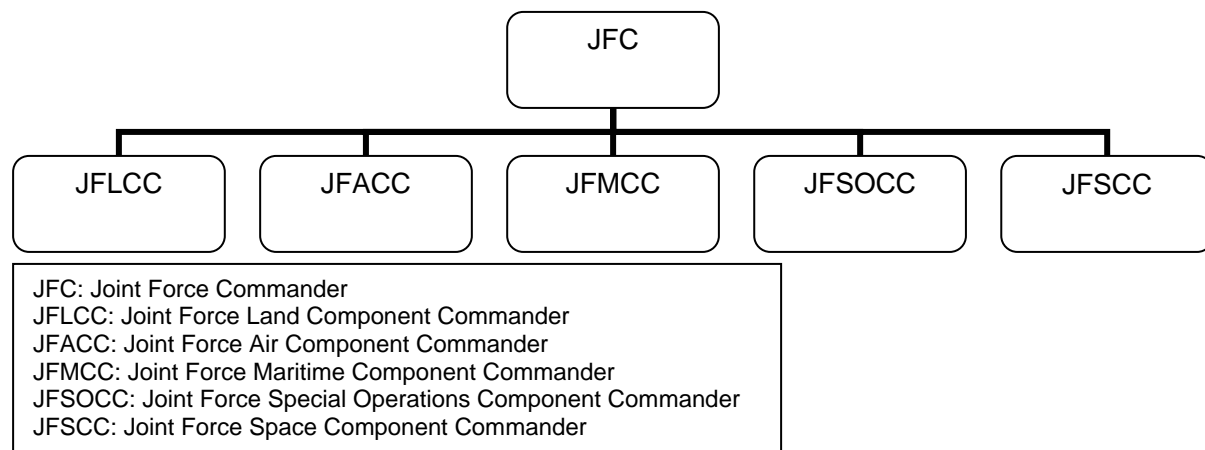


Figure 4. Hierarchical Command Structure

⁸⁴Alberts, David S., and Richard E. Hayes. *Power to the Edge: Command...Control...in the Information Age* (Washington D.C., Library of Congress Cataloging-in-Publication Data, 2003), 43.

Figure 5, however, represents the networked command structure. The components surrounding the JFC would have access to all information pertaining to contingency planning and battlefield operations. At the same time, however, the JFC would retain the ability to exercise command and, just as importantly, visibility of the planning process through the NCE. Systems such as the Army's Blue Force Tracker (BFT) would provide the JPMC with a robust COP and the USAF's Theater Battle Operations Network-centric Environment (TBONE) system would facilitate real-time C2. The result would be a precise, more efficient, and markedly more effective joint campaign.⁸⁵

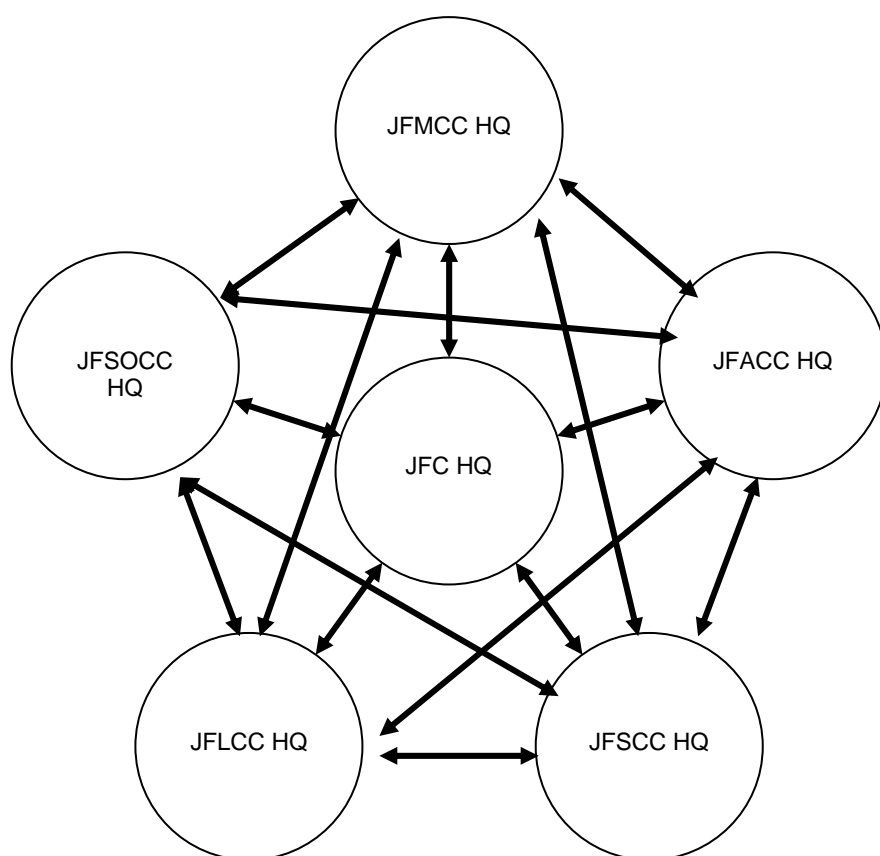


Figure 5. Networked Command

The organizational breakdown within the JPMC would consist of a distinct planning staff for each component similar to that of today. For

⁸⁵TBONE is designed to provide a dynamic planning and execution capability that will link requests, effects, operational guidance and supporting tasks with temporal/geospatial-unified databases, and machine-to-machine processes.

example, the JFACC would maintain an AOC-like organization inside the JPMC. The function of this AOC would be to facilitate the air component's planning effort in addition to serving as the JFC's point of contact for all matters pertaining to employment of the air component's assets. While the AOC would retain, and most likely improve upon, much of the capability it has today in terms of real-time tasking and time-sensitive-target (TST) operations, like the JPMC itself, its main role would be planning. During execution the AOC would monitor the operation rather than exercise command and control as it does today.

From a functional standpoint, the primary difference between the AOC of today, for example, and a future JPMC is the role each organization plays. Today's AOC has an integral role in both the campaign-planning and execution phase for the air component. ATO production and TST coordination, for example, originate from within today's AOC. The AOC pervades the air component's planning and execution. The role of a future JPMC during execution, however, would be much less prominent than that of today's AOC. The NCE would enable a JPMC to be most active and visible only during the planning phase. Using collaborative planning tools within the NCE, the components would develop a synchronized and integrated campaign plan in concert with one another to achieve synergistic battlefield effects in execution.

Then, during execution, the JPMC would serve only in a monitoring capacity, unless the political situation dictated otherwise. Exploiting the benefits of the NCE, the JFC would publish the commander's intent and mission orders and allow the Joint Force to execute pursuant to those orders. Rather than centrally control the execution phase, the Joint Force would self-synchronize and execute the plan with little-to-no external interference from the JPMC. If, however, a small-scale situation were to arise with high political sensitivities requiring centralized execution, then the JPMC could intervene using the same tools now available to the JFC. Ultimately, to achieve the benefits of operating in a NCE, however, the JPMC should be as unobtrusive as possible during execution.

The foundation upon which the JPMC would be based is the NCE. The question is whether the US can transform itself from the traditional hierarchical command structure into the networked command structure to embrace a JPMC. The next chapter will explore the NCE-concept as it applies to the Joint Force. After that, Chapter 4 will address current technological limitations that must be overcome in order to create the NCE within which the Joint Force will operate.

Chapter 3

Creating the Net-Centric Environment—Social Adaptation

“This is about human behavior. Remember that to network is a verb. A platform is a noun. So when we shift from being platform centric to network centric we shift from focusing on things to focusing on behavior or action. That is where we find the power. And when you rack and stack all of that what we are really talking about is a new theory of war because we are talking about new sources of power.”

VADM (ret) Arthur Cebrowski
Speech to NCW 2003 Conference
22 January 2003

The changing character and conduct of warfare require a fundamental shift in the way the US military integrates and employs the Joint Force. Joint Force elements increasingly find themselves in unfamiliar situations within complex, uncertain, and rapidly-changing operating environments. To succeed in these environments, forces need the ability to integrate varied, dynamic, and often unanticipated sets of capabilities, potentially drawn from across and beyond the Joint Force, in order to achieve mission objectives. Warfighters need to reduce the impediments to the flow of information and reduce the inherent friction of adjusting Joint-Force capabilities to new tasks and missions. The Joint Force needs to increase the level of integration among its various capabilities and function at increasingly lower echelons.⁸⁶ The emerging solution to this new environment is net-centric operations.

This chapter opens with a discussion of the hierarchical nature of military organizations. Next, the discussion focuses on the benefits of operating in a NCE and the corresponding principles that enable NCO. Finally, the chapter addresses the capabilities and attributes an effective organization must have in order to attain the benefits of operating in a NCE.

⁸⁶*Net-Centric Environment Joint Functional Concept (NCE JFC)*. US Government White Paper (Washington, D.C.: Department of Defense, December 2004), 9.

The Military Hierarchical Culture

Military organizations today are a byproduct of the Industrial Age. Cultural evolution and technological developments of the 20th century formed the underlying principles of traditional C2. Among others, these principles are decomposition, specialization, and hierarchy.⁸⁷ These principles remain important elements in military organizations, both in the US and around the world.

Industrial-Age businesses, associations, and military organizations applied a ‘divide and conquer’ mentality known as decomposition. These organizations defined their roles and activities as precisely as possible into coherent subsets that could be mastered by existing knowledge, technologies, and personnel. Military organizations applied decomposition methods as a means of simplifying warfare by dividing it into manageable pieces.⁸⁸

As a result of decomposition, specialization became an Industrial-Age principle.⁸⁹ In military organizations, specialization provides an avenue for efficient career development and training. In fact, “specialized capabilities often generated capacities that simply could not be created by groups of generalists.”⁹⁰ Today’s integrated operations would not be possible without specialized personnel, processes, organizations, and equipment developed during the Industrial Age.

This approach comes at a price, however. Organizational decomposition and specialization induce an absence of jointness and a lack of synergy. The most common means a military employs to minimize this cost is deconfliction. Deconfliction enables Industrial-Age service components to operate on the battlefield without interfering with or harming each other. Only within the last

⁸⁷Alberts, David S., and Richard E. Hayes. *Power to the Edge: Command...Control...in the Information Age* (Washington D.C., Library of Congress Cataloging-in-Publication Data, 2003), 37.

⁸⁸Alberts, *Power to the Edge*, 38.

⁸⁹Alberts, *Power to the Edge*, 39.

⁹⁰Alberts, *Power to the Edge*, 40.

20 years has the US military attempted to mitigate this limitation, albeit with uneven success.

“The organizational consequence of Industrial Age specialization is hierarchy.”⁹¹ An organization deeply rooted in decomposition and specialization requires management to meld the pieces together. The number of individuals over which a leader may maintain an effective span of control drives the overall size of a hierarchical organization.⁹² Civilian hierarchies were established on the principle that an effective span of control was a dozen or less individuals. Some researchers argue for a span of control as small as three to six individuals. Others discuss the need for multiple layers intended to permit personal interaction between responsible managers and individuals at the next layer. Military organizations were formed on similar principles, but modified “in response to the need for clear and constant communications in the battlespace.”⁹³

The sheer size and makeup of the DoD is a reflection of this hierarchical structure. “The number of layers is a function of the span of control. As the span of control decreases, the number of layers that are needed increases.”⁹⁴ In organizations such as this, information must flow both up and down the chain of command. All information intended for subordinates is recognized as belonging to and flowing through the organization. “Control of information was a major tool for controlling Industrial Age organizations.”⁹⁵

Despite some progressive doctrine, this hierarchical organizational structure and its associated characteristics form the construct of the US military that went to war in Afghanistan and Iraq. American forces performed admirably against adversaries also rooted in Industrial-Age thought.

Stove-piped, Hierarchical Limitations

⁹¹Alberts, *Power to the Edge*, 41.

⁹²Alberts, *Power to the Edge*, 41.

⁹³Alberts, *Power to the Edge*, 42.

⁹⁴Alberts, *Power to the Edge*, 43.

⁹⁵Alberts, *Power to the Edge*, 43.

In order to deal with the complexities of war, the US military is separated into specialized components. The organization within each component is, as one would expect, hierarchical in nature. The interaction between the components themselves, however, is also stove-piped. The components conduct essentially independent planning, execution, and C2 over their own forces. This componenty leads to problems in a joint fight.

Operation Anaconda is one high-profile example that illustrates the limitations of this separate-component planning process. Ultimately, Operation Anaconda was a success.⁹⁶ However, eight Americans died during the operation and 80 were wounded.⁹⁷ “It was a complex, non-linear battle that demanded full integration of Joint forces—and, to the frustration of all, revealed some Joint warfighting stress points.”⁹⁸ According to Dr. Rebecca Grant in her report *Operation ANACONDA: An Airpower Perspective*, coordination between the land and air components at all levels was a problem. The CFLCC and his staff planned Anaconda in the first half of February of 2002, but the air component did not bring its full planning resources to bear until the last week of that month. “Much of the problem seemed to stem from the lack of clear and frequent contact between the right elements of the staffs of the two components.”⁹⁹ The main problem with Anaconda was the lack of a “free and full exchange of information about upcoming operations.”¹⁰⁰ As the CFACC, Lieutenant General T. Michael Moseley, put it, “OPSEC and maintaining organic capability made the system less open...Had the system been more open, and had it in fact offered those things that, as a joint commander, I expected to get before a joint operation, things would have been a whole lot cleaner.”¹⁰¹

⁹⁶*Operation Anaconda: An Air Power Perspective*. Washington, D.C.: Headquarters United States Air Force, 7 February 2005, 4.

⁹⁷*Anaconda*, 3.

⁹⁸*Anaconda*, 3.

⁹⁹*Anaconda*, 114.

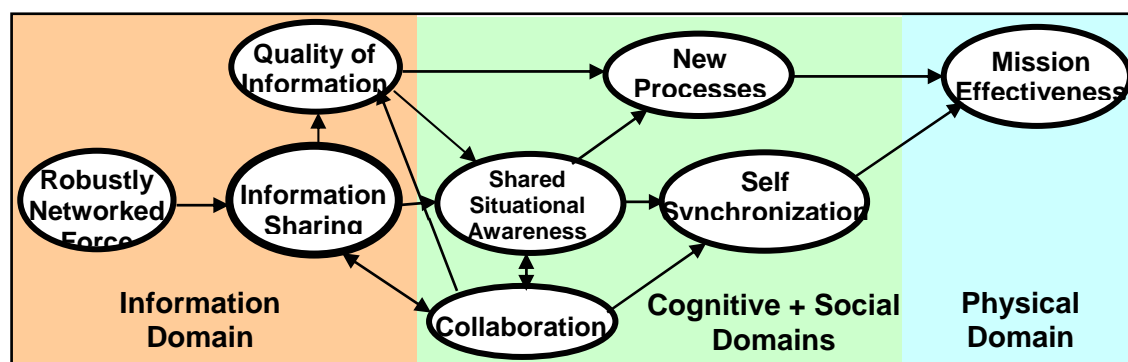
¹⁰⁰*Anaconda*, 118.

¹⁰¹*Anaconda*, 118.

The examination of Operation Anaconda is at least a first step in recognizing the weakness of today's component planning process. As Gen Moseley put it, "The silver bullet for Anaconda is better orchestration at the component level."¹⁰² With the limitations of component planning in mind, however, does the Joint Force recognize the benefits of operating in a NCE?

The Net-Centric Environment

Operations in a NCE will be characterized by information-sharing and collaboration. This collaboration will enable a heretofore unmatched degree of integration and constructive interdependence.¹⁰³ The NCE is a social construct supported by an advanced information infrastructure.¹⁰⁴ The social skills required to operate in the NCE and the technology necessary to support NCE's social construct are divided into two areas: the knowledge area and the technical area. The technical area is comprised of the physical aspect of the NCE, to include the infrastructure and other technologically driven capabilities. The knowledge area, on the other hand, consists of the consumer's ability to manipulate and make use of data for oneself and others as the information is made available on the network. These two areas must be developed concurrently in order to achieve the synergistic effects of operating in a NCE. Development in both areas is crucial to achieving a mature NCE.¹⁰⁵ See Figure 6.



¹⁰² *Anaconda*, 118.

¹⁰³ NCE JFC, 19.

¹⁰⁴ NCE JFC, 12.

¹⁰⁵ NCE JFC, 2.

Figure 6. The Central Idea of Net-Centric Operations

Investments that address only the technical and informational aspects of the NCE will garner limited gains in the overall agility and effectiveness of the Joint Force. The USAF currently appears to be in this stage of NCE transformation. The AOC weapon system concept is facilitating great strides in the technical area, but transformation in the knowledge area is slow to take hold. Switching from a platform-centric environment requires surmounting internal and external organizational and policy barriers that will build shared awareness and situational understanding, enabling common decision-making.¹⁰⁶ This cultural change must be supported by training and education, as well as by ensuring that Joint-Force elements have incentives to use the technical networks to draw on appropriate capabilities, regardless of their geographic or organizational location.¹⁰⁷

Knowledge-area principles generally embrace sharing of and access to information. They include information and decision rights and responsibilities, end-to-end transparency, communities of interest, and interdependence. These four principles must be embraced if an organization is to reap the benefits of NCE and NCO.

Each individual in the NCE has rights and responsibilities to share information and to make decisions. The effectiveness of the Joint Force is dependent upon individuals exercising those rights and responsibilities. Individuals in the NCE will be empowered and enabled to make decisions and to act within the context of command intent and to share situational understanding across the Joint Force. These rights and responsibilities apply to both the formal command-and-control process and to less formal collaborative decision-structures.¹⁰⁸

¹⁰⁶In a platform centric environment, a platform sees and shoots at the enemy. In a net-centric environment, information from a network is the initiator. Also, weapons, surveillance systems, tactical displays, and tactical decision aids are on the same network.

¹⁰⁷NCE JFC, 11.

¹⁰⁸NCE JFC, 15.

End-to-end transparency is a principle of the NCE and requires a culture of openness and visibility across the Joint Force at the tactical level. “The information that is generated, processed, and consumed in a NCE will need to be visible, accessible, understandable, verifiable, current, and trusted.”¹⁰⁹ Information-access and its visibility will be based on security clearances, the role of the individual, and a dynamic need-to-know requirement. “Transparency requires a move from a ‘share-information-by-exception’ model to a ‘withhold-by-exception’ model.”¹¹⁰

The use of Communities of Interest (COIs) throughout the Joint Force is a principle that supports the NCE with capabilities such as flexible organizations, shared situational awareness, and collaboration. These organizations interconnect resources from stable and permanent organizations, giving them a flexibility to address issues in the complex, uncertain and dynamic operational environment.¹¹¹

Constructive interdependence is the creation of new capabilities from connection of the latent capabilities within the Joint Force. The NCE allows for the creation of capabilities that have been unavailable or even unknown, but which are adapted to the characteristics of the specific environment in which they are intended to function. By removing the barriers to the flow of information and connecting geographically dispersed elements, the NCE provides the Joint Force the ability to exploit the efficiencies of the specialization of labor. In this way, units can confidently rely upon their ability to access required capabilities of other units.¹¹²

Required Capabilities

In order to function effectively in a NCE, organizations must develop certain capabilities and attributes. These skill sets are what enable organizations to interact with each other, gather and process information, and

¹⁰⁹NCE JFC, 16.

¹¹⁰NCE JFC, 16.

¹¹¹NCE JFC, 16.

¹¹²NCE JFC, 18.

fully exploit both their own information and that of others. Like the NCE principles, these organizational capabilities and attributes are divided into knowledge-area and technical-area characteristics.

The ability to function in a NCE depends on achieving capabilities in the knowledge and technical areas. The latter will be addressed in the next chapter. The knowledge area comprises the individual understanding and decision-making achieved through collaborative techniques and organization. The technical-area capabilities provide the means to achieve the knowledge-area capabilities.¹¹³

Knowledge Area Capabilities

There are seven specific knowledge-area capabilities that are crucial to reaping the full benefits of operating in a NCE and an operationally-capable JPMC. These capabilities are the ability to: establish appropriate organizational relationships, collaborate, synchronize actions, share situational awareness, share situational understanding, conduct collaborative decision-making/planning, and achieve constructive interdependence. These capabilities would enable the JPMC to exploit the technical aspects of the network.

The *ability to establish appropriate organizational relationships* includes being able to change organizational and command relationships in accordance with mission needs and to use flexible organizational constructs. The NCE supports existing frameworks and provides a new COI framework to support organizational needs.¹¹⁴

The *ability to collaborate* is crucial in that collaboration must include geographically separated participants, and involve all relevant parties. Doctrinal, cultural, and organizational limits to collaboration must be removed.

¹¹³NCE JFC, 22.

¹¹⁴NCE JFC, 22.

Leaders will need to be trained, and procedures implemented, to develop trust in collaborative decision-making processes and organizational structure.¹¹⁵

The *ability to synchronize* actions is important because the fast pace of operations in the NCE will require self-synchronization. This will enable the Joint Force to flexibly adapt actions to take advantage of opportunities and minimize impacts of changing or emerging threats.¹¹⁶

The *ability to share situational awareness* means that individuals will need not only to develop their own situational awareness, but also to share this awareness. They will need to see how others perceive the situation, be capable of processing information from multiple sources, yet remain focused on the current tasking.¹¹⁷

The *ability to share situational understanding* is critical. “Where situational awareness is the ‘who’s where and what are they doing’ aspect of battlespace knowledge, situational understanding is the ‘what does it mean and what can I do about it’ aspect.”¹¹⁸ Sharing situational understanding throughout the NCE provides a synergy that leads to collective understanding and high-quality decision-making.

The *ability to conduct collaborative decision-making/planning* is important because decision-makers need sophisticated support tools to succeed in the ever-changing 21st century battlespace. They need the ability to analyze potential courses of action quickly and with sufficient resolution to address potential second and third-order effects. “The collaborative decision-making process will enable commanders to be aware of other entities’ changing tasks and missions and their ability to perform those missions and tasks.”¹¹⁹

The *ability to achieve constructive interdependence* provides those in the NCE a nearly limitless combination of latent service and component capabilities which create additional capabilities. By looking across the

¹¹⁵NCE JFC, 23.

¹¹⁶NCE JFC, 23.

¹¹⁷NCE JFC, 23.

¹¹⁸NCE JFC, 23.

¹¹⁹NCE JFC, 23.

network, geographically-dispersed units are able to combine their respective unused capabilities efficiently and effectively at the tactical level to better accomplish assigned missions.¹²⁰

Taken together, these knowledge-area capabilities comprise both individual and group capabilities through collaboration and various organizational options. “The individual cognitive capabilities are enhanced through the group sharing capabilities. Situational understanding becomes shared situational understanding and decisionmaking becomes collaborative decisionmaking, providing a more powerful set of capabilities.”¹²¹

Transforming socially to operate in a NCE is a radical shift for the DoD. In order for this transformation to occur, the Joint Force must take three steps. The first is to recognize the limitations of today’s stove-piped, hierarchical military structure. The next is to acknowledge the benefits that operating in a NCE brings to the military culture. The final step is to embrace the need to transform the US military structure into one that takes advantage of those benefits. There are, however, current technological impediments to creating the NCE. There are also areas of technological improvement that go beyond the NCE that are necessary to facilitate a functioning JPMC. The next chapter will discuss these limitations that must be overcome in order to create the NCE and JPMC of the future.

¹²⁰NCE JFC, 23.

¹²¹NCE JFC, 24.

Chapter 4

Removing Technological Impediments to Net-Centric Operations and a JPMC

“The soldier on the front line is who needs to be supported. He needs a network structure and he has to be shown that power comes out of network structure. But he has good reason to complain. Our information architectures are arranged in a hierarchical fashion. They tend to be very, very brittle, but what bothers me most is that the people at the bottom are those who are in mortal danger and they are the least well connected. We have a big last mile interoperability problem and we have got to solve it.”

VADM (ret) Arthur Cebrowski
Speech to NCW 2003 Conference
22 January 2003

Adopting a JPMC faces technological barriers. As the previous chapter discussed, the underlying foundation of future US military combat capability requires a robust, ubiquitous network capable of sharing vast quantities of information. Secretary of Defense Donald Rumsfeld’s *Transformation Planning Guidance* provides a coherent direction in which the components must proceed in developing and fielding combat systems. According to him, “Information age military forces will be less platform-centric and more network-centric. They will be able to distribute forces more widely by increasing information sharing via a secure network that provides actionable information at all levels of command.”¹²² The technological challenge, of course, becomes the development, fielding, and implementation of this highly capable network.

The DoD’s approach to developing this network is based upon the knowledge-area principles discussed in the previous chapter in addition to technical-area principles that lay the foundation of a NCE. This chapter will discuss those technical-area principles and also the technological challenges that stand in the way of attaining the ability to adhere to these principles.

¹²²US Department of Defense. *Transformation Planning Guidance* (Washington, D.C.: Office of the Secretary of Defense, April 2003), 10.

There are twelve identified technical capabilities that will serve as enablers to the knowledge-area capabilities to achieve the benefits of operating in a NCE.¹²³ This thesis addresses the three most prominent: the technical ability to store, share, and exchange information and data; the ability to employ geo-spatial information; and the ability to maintain/survive.

The *ability to store, share, and exchange information and data* includes identifying and labeling information, placing it in a database, and announcing its presence to those who need it. There must be a mechanism in place to retrieve the information, store it in such a manner as to facilitate the easy retrieval by those who need it, and a way for users to identify the information they need so they are alerted to its availability. Multiple users must be able to work with the information in order to produce unified, integrated updates. Finally, there must be a means to maintain a historical record.¹²⁴

The *ability to employ geo-spatial information* involves formatting, tagging, and correlating all coordinates to other geo-spatial information in an underlying database (i.e., population, utilities, transportation, services, climate, etc.). “This feature is many times more powerful than a standard map display in that it allows layering of information and drill-down capability from the display.”¹²⁵

The *ability to maintain/survive* ensures network service while under both physical and information attack. The network should degrade gracefully, dynamically rerouting services as nodes are incapacitated and/or as information flow requirements change.¹²⁶

¹²³The twelve technical-area capabilities are the ability to create/produce information; the ability to store, share, and exchange information and data; the ability to establish an information environment; the ability to process data and information; the ability to employ geo-spatial information; the ability to employ information; the ability to find and consume information; the ability to provide user access; the ability to access information; the ability to validate/assure; the ability to install/deploy; the ability to operate/maneuver; the ability to maintain/survive; and, the ability to provide network services.

¹²⁴NCE JFC, 24.

¹²⁵NCE JFC, 25.

¹²⁶NCE JFC, 26.

In addition to the above enhancements that facilitate NCE, five primary areas lag in terms of the technological development necessary to field and support a JPMC. The first is the Global Information Grid (GIG), which serves as the foundation for NCO. The entire network will emanate from the GIG. The second limitation is network-compatible software designed to enable collaborative interaction in the planning phase. The third roadblock involves an absence of equipment and software specifically designed to facilitate inter-service interoperability during mission execution. The fourth impediment is a responsive C2 system which facilitates real-time monitoring and control over select pieces of the joint force in the field. Finally, the fifth area is limited bandwidth capacity. Developments and improvements in these five areas will pave the way for a JPMC, which ultimately will enable more effective and efficient Joint Force planning and execution.

Global Information Grid

The GIG is the backbone of the DoD's transformation process. Conceptually, the GIG is more than just the equipment and architecture that make up the network. The GIG also includes a vision and approach to implementation of many different processes, to include systems acquisition. "The GIG is the organizing and transforming construct for managing [IT] throughout the [DoD]. GIG policy, procedures, and...architectures are the basis for developing and evolving IT capabilities...and management of legacy IT services and systems."¹²⁷ The GIG vision implies a fundamental shift in information management, communication, and assurance.

The GIG will empower users through information access anytime and anyplace, under any conditions. This requires an information capability that is global, survivable, secure, and reliable. The goal is to increase the net-centricity of the warfighter by enabling increased interaction among the GIG users. The GIG will enable increased information richness and expertise that

¹²⁷"Global Information Grid." *Defense Acquisition University: Defense Acquisition Guidebook*, n.p. On-line. Internet, 17 May 2005. Available from http://akss.dau.mil/dag/Guidebook/IG_c7.2.asp.

can be applied to supporting operational decisions. It will also support increased agility to meet changing operational needs and increased assurance that the right information and resources to do the task will be there when and where they are required.¹²⁸

The implementation component of the GIG is the existing, globally interconnected, end-to-end set of capabilities, processes, and personnel for collecting, processing, storing, disseminating, and managing information. The GIG includes all IT and National Security Systems throughout the DoD, their interfaces to allied and coalition forces, industry, and other Federal agencies. All DoD information systems that currently exist or that have been approved for implementation comprise the GIG. Every DoD acquisition program having an IT component is a participant in the GIG. Each new IT-related acquisition program replaces, evolves, or adds new capabilities to the GIG.¹²⁹

In the end, the GIG concept will serve to guarantee the interoperability of all systems acquired by the DoD.

Collaborative Planning

Collaborative planning involves actors sharing data, information, knowledge, perceptions or concepts when they are working toward a common purpose and how they might achieve that purpose efficiently or effectively.¹³⁰ In a military context, collaborative planning involves actors with different functional and geographic areas of responsibility. In a broader context, however, collaboration consists of a number of different dimensions and varies considerably in application.

Collaboration involves varying dimensions of media, time required, continuity, breadth, content richness, domain, structure, roles, and linkages.

¹²⁸“Global Information Grid.” *Defense Acquisition University: Defense Acquisition Guidebook*.

¹²⁹“Global Information Grid.” *Defense Acquisition University: Defense Acquisition Guidebook*.

¹³⁰ Alberts, David S., et al. *Understanding Information Age Warfare* (Washington D.C., Library of Congress Cataloging-in-Publication Data, 2004), 185.

‘Medium’ refers to the medium through which the collaboration takes place. Face-to-face collaboration is the standard against which all others are measured. Video teleconferencing is the most elaborate alternative. White boards and other technologies that allow actors to look at the same images have also become widely available. ‘Time’ refers to the amount of time involved in the collaborative process. As communications technologies mature and interoperability problems are resolved across warfare arenas and functional specializations, this factor will become less of a constraint on the collaboration process. ‘Continuity’ refers to whether the process is synchronous or asynchronous. When distributed headquarters are working in different time zones or the task is such that one actor is distracted or unavailable, collaboration tools that do not require continuous participation (such as email) may be preferable. However, they have some impact on the quality of the interaction. ‘Breadth’ refers to who participates, including the question of whether all the relevant types of expertise are available during the collaborative process. ‘Richness’ refers to whether individuals working together are simply sharing data and information; genuine collaboration requires that participants interact at the conceptual level by pooling their knowledge and/or exploring their understandings of the situation. ‘Structure’ refers to the authority structure. Pure peer groups operate very differently than hierarchical groups in which leaders are apparent. Structure also includes the communication pattern—whether the members of the group are multi-connected or connected by some other pattern. Variations in each of these entities determine the extent to which collaboration occurs.¹³¹

In reality, collaboration has always taken place at a rudimentary level within the DoD. In the past, “Traditional collaboration in the information domain has extended to little more than data sharing...Data was often processed locally or at very high levels and not really shared across echelons or

¹³¹ Alberts, *Understanding Information Age Warfare*, 187.

functional arenas.”¹³² While Industrial-Age doctrinal and organizational customs limited sharing, this sort of information flow was also constrained by a lack of automated data processing capability and limited bandwidth. As a result, “Traditional C2, because of weak information sharing, was often a quest to ensure that mutual interference in the battlespace was avoided.”¹³³ Information-Age developments have led to more attempts at genuine collaboration.

Collaboration in the Information Age with accompanying technological advancements will lead to considerable benefits and improvement for the DoD. “First, the sharing of data greatly improves the likelihood of developing a common (shared) picture of the battlespace.”¹³⁴ Data pooled from multiple sensors will lead to a “fusion of information which greatly enhances its richness,” ultimately resulting in a more accurate and robust idea of what’s actually taking place.

The second likely benefit of Information-Age collaboration involves the ability for information users to process and act more rapidly on data that is relevant specifically to them. The real question, however, is whether collaboration would be beneficial to the US military in terms of planning or execution?

According to the DoD’s Command and Control Research Program, “Collaborative [decision-making] can be expected to generate better choices...[C]ollaboration will improve the linkage between planning and execution.”¹³⁵ With this in mind, the USAF has begun to explore and apply collaborative planning concepts within its AOC organization. From a technology-development standpoint, however, collaborative planning on the scale required for a JPMC is not yet within reach.

The USAF AOC currently employs some relatively rudimentary systems and programs designed to facilitate collaborative planning within the air

¹³² Alberts, *Understanding Information Age Warfare*, 191.

¹³³ Alberts, *Understanding Information Age Warfare*, 193.

¹³⁴ Alberts, *Understanding Information Age Warfare*, 193.

¹³⁵ Alberts, *Understanding Information Age Warfare*, 197.

component alone. One such program is the Master Air Attack Planning Toolkit (MAAPTK). It is a planning tool designed to provide near-real-time battlespace information that enables planners to generate battle plans that are accurate and applicable to developing situations. Mission planners can view key graphically-displayed information so that they can quickly understand the essential elements of a situation. Because the MAAPTK software eliminates the need to plot information manually on paper, it significantly streamlines the Master Air Attack Plan and cumbersome Air Tasking Order (ATO) production process.¹³⁶ The MAAPTK's ability to access information from various databases enables planners to view information about Friendly Order of Battle resources, targets, and airspace. In addition, the MAAPTK can be connected to other data sources to view other types of data, such as threat information.¹³⁷

Although it would be a much more complicated undertaking, a MAAPTK-like capability is necessary to facilitate joint planning in a JPMC and generate an all-encompassing perspective. This capability currently does not exist, yet should be feasible technically well prior to implementation of the NCE.

Interoperability in Execution

Inter-service transparency is another mandatory requirement for a JPMC to facilitate synergy on the battlefield. The individual components must have the capability to observe each other's actions from the planning phase through execution of battlefield operations. Building the infrastructure and removing the cultural impediments to the flow of information, save the need to protect the information from those who should not have it, requires formal and informal organizations making their structures and processes transparent to each other. Transparency requires a move from a 'share-information-by-exception' model to a 'withhold-by-exception' model. Improving the transparency among information consumers, processors, and producers

¹³⁶*Software User's Manual for the Master Air Attack Planning Toolkit version 1.2* (Colorado Springs, CO.: Intelligent Software Solutions, 9 July 2004), 1-1.

¹³⁷MAAPTK, 1-1.

enables geographically separated individuals and groups to build the trust required to share critical information and integrate collective capabilities at a much lower and effective level.¹³⁸

The most recent example of a system designed to contend with the challenge of transparency during the execution phase of an operation is the Army's Force XXI Battle Command, Brigade-and-Below (FBCB2). Also known as Blue Force Tracker, FBCB2 is designed to provide SA and C2 to the lowest tactical echelons. It facilitates a seamless flow of battle command information across the battlespace and interoperates with external C2 and sensor systems.

Functionally, FBCB2 supports lower-echelon battle-command tactical-mission requirements, including real-time SA for the commander, staff, and soldiers; a shared COP of the battlespace; graphic displays, with friendly and enemy unit locations; and target identification.¹³⁹

There is a problem with FBCB2, however. The FBCB2/BFT system is not standardized across the Joint Force. FBCB2 is far from the only command-and-control system on today's battlefields. For example, during the full combat phase in OIF, Joint-Force planners juggled more than 60 such systems.¹⁴⁰ All had different protocols and policies; none presented itself as the single standard for others to adopt.

In addition to technical compatibility issues, every system has its own funding stream and management structure, giving its 'owner' a vested interest in maintaining a fractured status quo. Add tracking devices employed by other coalition members, and the situation gets more problematic.¹⁴¹ The DoD needs to enforce common protocols and interoperability prior to permitting system acquisition if NCE is to become reality.

Command and Control

¹³⁸NCE JFC, 16.

¹³⁹"Force XXI Battle Command, Brigade-and-Below." *Federation of American Scientists*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.fas.org/man/dod-101/sys/land/fbc2.htm>.

¹⁴⁰"Standardize Blue Force Tracking." *DefenseNews.com*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.defensenews.com/story.php?F=494578&C=>.

¹⁴¹"Standardize Blue Force Tracking."

A fully networked force would require very little in the way of C2 during the execution phase. Collaborative planning and self-synchronization can ultimately push the preponderance of the decision making to the ‘edge’ of the organization. Because the Joint Force would achieve the greatest degree of effectiveness without centralized control, the C2 function of a JPMC would consist mainly of monitoring the situation. There are likely to be occasions, however, wherein political sensitivities require centralized C2 from within a JPMC. So, there has to be a system in place to carry out the commensurate level of C2 over the joint force. The current USAF tool to accomplish this level of C2 is the Theater Battle Management Core Systems (TBMCS) program, and this can serve as a model for the Joint Force.

TBMCS provides the Combat Air Forces (CAF) and the Joint Force with an automated and integrated capability to plan and execute the air war. “TBMCS provides the air commander with the means to plan, direct, and control all theater air operations in support of command objectives and to coordinate with ground and maritime elements engaged in the same operation.”¹⁴² At the component level, TBMCS provides the JFACC and subordinate staffs with an automated spectrum of C2 capabilities enabling the planning and execution of air operations. It provides the JFACC with the tools necessary to generate, disseminate and execute the ATO in a joint and coalition contingency.

The near-term future C2 system for the USAF is the Theater Battle Operations Network-centric Environment (TBONE) C2 system. Compared to TBMCS, TBONE will have a smaller footprint, enhanced deployability, and scalability. It will migrate the AOC to a web-enabled, PC-capable application environment, redesign databases and applications for network-centric operations, and utilize portal technologies to share information and reduce legacy-equipment costs. Additionally it will break the lock in the seemingly never-ending battle with proprietary systems. Software will be ported from the

¹⁴²“Theater Battle Management Core System.” *Federation of American Scientists*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.fas.org/man/dod-101/sys/ac/equip/tbmcs.htm>.

thick-client world of UNIX to tomorrow's thin-client, web-enabled PC environment.¹⁴³

Similar to collaborative planning and transparency, C2 from a JPMC will require a comprehensive system of systems to facilitate effective and efficient C2 over the joint force. Such a system does not currently exist.

Expanded Bandwidth

The benefits of information-sharing and access over the battlefield should be enormous. From a USAF perspective, the networked systems and programs within the AOC are having a positive effect already. "However, this improved sharing of information does not come without costs. These costs will primarily be in the form of greater demands for bandwidth to deliver the shared information and an increased need for computational power (either in the rear or forward) to organize and present it."¹⁴⁴

Expanded bandwidth is the enabler necessary for a true JPMC. As NCO become increasingly common within the DoD, bandwidth availability is rapidly becoming a constraining factor. NCO applies communication-networked applications in the fastest, most universal method available. The network needs to be equally accessible by all branches of service for issuing and executing battle-command decisions and supporting the real-time and wireless applications envisioned for NCW. It also needs to provide secure communications.¹⁴⁵

When the vision of NCO is contrasted with the reality of the current DoD communications infrastructure, a daunting task emerges. Today's DoD network is burdened with vast quantities of legacy equipment. The slow speed of this network, the significant differences among vendor equipment, and the

¹⁴³“Theater Battle Operations Net-centric Environment.” *Air Force Command and Control, Intelligence, Surveillance, and Reconnaissance Center*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.afc2isrc.af.mil/tbone/faqs.htm>.

¹⁴⁴Alberts, *Understanding Information Age Warfare*, 195.

¹⁴⁵“Evolving the DoD Network: A Call for Action.” *Armed Forces International*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.armedforces-int.com/article.asp?pubID=15&catID=259&artID=474>.

heavy reliance on point-to-point communications pose great impediments to networked operations.¹⁴⁶

The DoD is tackling the limited bandwidth problem with two approaches. The first is the Global Information Grid Bandwidth Expansion (GIG-BE) program. The second is a transformation from radio-frequency (RF) communications technology to laser-communications technology.

The DoD's GIG-BE program is intended to provide a robust network foundation for worldwide network-centric operations, supporting multiple transformation objectives.¹⁴⁷ The GIG-BE program will create a ubiquitous 'bandwidth-available' environment to improve national security intelligence, surveillance, and reconnaissance (ISR), and C2 information-sharing. To implement GIG-BE, the Defense Information Systems Agency (DISA) is aggressively enhancing its current end-to-end information transport system, the Defense Information System Network (DISN), by significantly expanding bandwidth and physical diversity to selected locations worldwide. The program will provide increased bandwidth and diverse physical access to approximately 100 critical sites in the continental United States and in the Pacific and European Theaters. These locations will be interconnected via an expanded GIG core. Specifically, GIG-BE will connect key intelligence, command, and operational locations with high bandwidth capability over physically diverse routes; the vast majority of these locations will be connected by a state-of-the-art optical-mesh network design.¹⁴⁸ The GIG-BE program is scheduled to reach Final Operational Capability (FOC) at 92 sites by 30 September 2005.¹⁴⁹

The GIG-BE program fully supports DoD's continuing investments in surveillance assets, reach-back, sensor-to-shooter integration, collaboration, and enterprise computing. Removing current bandwidth limitations provides the catalyst for self-synchronization, shared situational awareness,

¹⁴⁶“Evolving the DoD Network.”

¹⁴⁷“GIG Bandwidth Expansion.” *Defense Information Systems Agency*, n.p. On-line. Internet, 17 May 2005. Available from http://www.disa.mil/main/prodsol/gig_be.html.

¹⁴⁸“GIG Bandwidth Expansion.”

¹⁴⁹“GIG Bandwidth Expansion.”

sustainability, and speed of command and action, allowing those closest to the reality of combat full access to a rich and enabling set of information assets.¹⁵⁰

Laser communications technology will also contribute to the DoD bandwidth expansion program. Laser communications have a number of advantages over RF, not least in the area of security. High-performance laser systems have an inherently high level of transmission security due to the transmitter's very narrow beam width. It is necessary to interrupt the beam in order to access information, and this is both difficult to achieve and easily detectable. For the same reasons, laser communications cause no interference with nearby RF sources. A further attraction of laser communications is they do not require Federal Communications Commission (FCC) licensing. Moreover, because lasers operate at a much higher frequency, they are able to achieve an exponential improvement in data throughput. Transferring responsibility for throughput from SATCOM frequencies and into the laser-communications world will also free up RF for other military users and for applications that laser communications cannot meet. Satellites designed to support laser communications are scheduled to begin deployment by 2011.¹⁵¹

Certain challenges remain before realizing these advantages. Environmental conditions such as rain and foliage seriously impair or preclude laser communications. In addition, a direct point-to-point link is required, which limits military applications over long distances impeded by the earth's curvature, mountain ranges, or even tall trees.¹⁵²

Summary

¹⁵⁰"GIG Bandwidth Expansion."

¹⁵¹"Laser Transformation." *Military Information Technology On-line Edition*, n.p. On-line. Internet, 17 May 2005. Available from <http://www.military-information-technology.com/article.cfm?DocID=597#top>.

¹⁵²"Laser Transformation."

The SECDEF's transformation guidance has mandated the adoption of NCO for the future DoD force. As such, new C2 mechanisms must adapt to operating within a network construct. A JPMC is no different in this regard. Five primary areas lag in technological development necessary to support a JPMC. All five revolve around networking. The Global Information Grid which serves as the foundation for NCO is incomplete. Network-compatible software designed to enable collaborative interaction in the planning phase is non-existent. Equipment and software specifically designed to facilitate inter-service interoperability during mission execution needs further development. A responsive C2 system which facilitates real-time control over the joint forces in the field does not yet exist. Finally, expanded bandwidth must be manufactured. Technological advances in these five areas will serve as enablers for a JPMC within the US military and DoD.

Chapter 5

Analysis and Conclusions

“There will be no moment at which the Department is ‘transformed.’ Rather, we are building a culture of continual transformation, so that our armed forces are always several steps ahead of any potential adversaries. To do so, we must envision and invest in the future today, so we can defend our homeland and our freedoms tomorrow.”

Donald H. Rumsfeld
Secretary of Defense
Transformation Planning Guidance, 2003

The transformation process currently taking place within the DoD is being driven by the evolving 21st century threat. In the *National Defense Strategy* (NDS), the Secretary of Defense notes that the current military structure must transform itself in order to deal with that threat. According to the NDS, “Transformation is...about changing the way we think about challenges and opportunities; adapting the defense establishment to that new perspective; and, refocusing capabilities to meet future challenges, not those we are already most prepared to meet.”¹⁵³

A key to this transformation process is attaining the ability to operate in a NCE. Within the DoD’s ‘capabilities-based’ approach, the NDS identifies eight key operational capabilities US forces must develop, one of which is the ability to conduct NCW.¹⁵⁴ According to the NDS, “The foundation of our operations proceeds from a simple proposition: the whole of an integrated and networked force is far more capable than the sum of its parts.”¹⁵⁵ If the Joint Force fully exploits both shared knowledge and technical connectivity, then the

¹⁵³US Department of Defense. *The National Defense Strategy of The United States of America* (Washington, D.C.: Office of the Secretary of Defense, March 2005), 10.

¹⁵⁴The eight key operational capabilities are: 1) strengthen intelligence, 2) protecting critical bases of operation, 3) operating from the global commons, 4) projecting and sustaining forces in distant anti-access environments, 5) denying enemies sanctuaries, 6) conducting network-centric operations, 7) improving proficiency against irregular challenges, and 8) increasing capabilities or partners—international and domestic. National Defense Strategy, 12.

¹⁵⁵National Defense Strategy, 14.

resulting capabilities will dramatically increase mission effectiveness and efficiency.¹⁵⁶

There are potential drawbacks, however, to conducting NCO.

Net-Centric Operations Drawbacks

As with any system, there are a number of problems associated with operating in a NCE. While there are many benefits to adapting the Joint Force to conduct NCW, weaknesses will undoubtedly arise as a direct result of the transformation. Six areas promise some potential difficulty: network physical vulnerability, information accuracy, information dependency, information ‘overload,’ questionable judgment, and adhering to commander’s intent.

The underlying assumption within a NCE is that the network will properly function. The very existence and functionality of the network is the critical piece that serves to enable NCO and NCW. Without the network, the information-sharing and exchange capabilities upon which NCO is based obviously do not exist. According to Major General Marilyn A. Quagliotti, Vice Director of the Defense Information Systems Agency (DISA), today’s networks are “operationally” fragile.¹⁵⁷ DISA needs to fix the Defense Information System Network (DISN), which is DISA’s part of the Global Information Grid (GIG), about 5,000 times a week. This number does not include the trouble tickets each service has on its part of the network.¹⁵⁸ From a reliability standpoint, this is a problem.

In addition to simple network functionality, there exists an inherent assumption that information in the NCE will be accurate. Within NCE literature, there is a notable lack of consideration for enemy deceptive measures. It is important to note that “because networks begin with sensors, they will always be vulnerable to jamming by moderately sophisticated foes.

¹⁵⁶NCE JFC, iv.

¹⁵⁷MAJ GEN Marilyn A. Quagliotti, Vice Director, Defense Information Systems Agency, “Net-Centric Manager.” Interview by Harrison Donnelly for *Military Information Technology Online Edition*, n.p. On-line. Internet, 18 May 2005. Available from http://www.military-information-technology.com/print_article.cfm?DocID=802.

¹⁵⁸Quagliotti.

Even the least capable enemy will be able sometimes to use deception or concealment to foil sensors, particularly with the coverage gaps that currently exist.”¹⁵⁹ Even more troubling is an enemy with the ability to attack the networks themselves. False or incomplete technical information can distort or impede network effectiveness.¹⁶⁰ Ultimately, the US will have to harden networks to mitigate these threats. How this might be done is not yet clear.

Another potential pitfall to operating in a NCE is information dependency. As the Joint Force becomes more accustomed to high-quality, real-time information, there is a risk that decision-makers will become hesitant or even paralyzed without it. “But because technology can and will fail, our military must have an ongoing commitment to mastering basic soldiering skills -- such as map-and-compass navigation, communications and the accurate verbal call for fire support-- even when the optimal ‘network’ is not there to facilitate them.”¹⁶¹

The potential for information overload is yet another drawback. From a decision-maker’s perspective, more information generally is better than less. An ironic difficulty can arise, however, when commanders become inundated with information. “Information may become intoxicating, turning tactical challenges into quantitative equations and distracting commanders from such basic military principles as initiative and decisiveness.”¹⁶² To solve this potential problem, appropriate information must be matched to the differing requirements at appropriate levels, and users must exercise judgment.

Another drawback to operating in a NCE may be judgment. Awareness does not necessarily impart judgment. The latter is derived from experience, training, education, and native intellect. Hierarchies tend to reward good judgment. Hence, it resides in higher echelons. How the network will impart and reward judgment remains to be seen.

¹⁵⁹John Luddy, “The Challenge and Promise of Network-Centric Warfare.” *Lexington Institute*, February 2005, n.p. On-line. Internet, 18 May 2005. Available from <http://www.lexingtoninstitute.org/docs/521.pdf>.

¹⁶⁰Luddy.

¹⁶¹Luddy.

¹⁶²Luddy.

Finally, one must address the potential pitfalls of the mission-orders and commander's-intent concepts that seem so ideal for operating in the NCE.

According to Dr. Rebecca Goolsby of the Office of Naval Research,

Military doctrine and vision statements lack a strong grasp of organizational processes and social theory needed to create networked forces...How will the military change its fundamental command and control architecture without entirely losing control of the situation as it did in Abu Ghraib? Will networked forces threaten to break and contort the chain of command, and if so, how can that be prevented?¹⁶³

The paradox of operating in a NCE is that the future Joint Force must be agile and free enough to make decisions in order to realize greater speed and efficiency in dealing with the 21st century threat environment. At the same time, the Joint Force must conform to rules of engagement and the rules of war. Potential adversaries, especially civilians with violent intentions, may not have any of these 'disadvantages.'¹⁶⁴

Decentralized decision-making and self-synchronization are critical to enable faster engagements that are more effective. Yet, according to Goolsby, there is a need to develop systems to monitor relationships and to measure the progress of self-synchronization and collaborative tools.¹⁶⁵ To succeed, any joint center must effectively embrace the dichotomy of network operations and hierarchy that pervades military operations of the 21st century. Still, the promises of NCE appear to outweigh these potential difficulties.

How well, then, are the individual services poised to adapt to operating in a NCE?

US Army

The Army's emphasis on subordinate empowerment and individual decision-making is quite conducive to operating in a NCE. In fact, the Army

¹⁶³Rebecca Goolsby, Ph.D., "Military Transformation: Modern Problems and Future Visions." On-line. Internet, 18 May 2005. Available from

http://www.casos.cs.cmu.edu/events/conferences/2004/2004_proceedings/Goolsby_Rebecca1.doc.

¹⁶⁴Goolsby.

¹⁶⁵Goolsby.

does appear to recognize the potential of NCW. Throughout OIF, the Army's use of its newly fielded Blue Force Tracker (BFT) system demonstrated only a superficial glimpse into what fielded forces stand to gain by transforming to operate in a NCE.¹⁶⁶ For example, Major General Buford C. Blount III, Commander, 3rd Infantry Division, lauded the unparalleled operational capability and situational awareness the COP gave him at his HQ during the Army's run to Baghdad. "I had four different brigade-size units with four different fights going on in four different directions, yet had [situational awareness] on each."¹⁶⁷ The COP enabled this type of aggressive operation. Without BFT, "I would have been much more cautious."¹⁶⁸

From a technology perspective, however, the Army currently does not focus the preponderance of its resources on networked equipment and infrastructure commensurate with NCO. That said, the Army is ripe for the transformation to operate in a NCE.

US Navy

Like the Army, the Navy's reliance on subordinate decision-making and individual initiative makes it a prime candidate to operate in a NCE. From a technology standpoint, the Navy also embraces advances in technology in its aircraft and throughout the fleet. The Navy has gone to great lengths to exploit platform-centric datalinks and similar capabilities in the past. The Navy has also experimented with true NCO in the field. In an interview after OEF, Rear Admiral Tom Zelibor, Commander, CTF-50, reflected on the comparative advantage NCO gave him during combat operations. According to Adm. Zelibor, "We correlated data; had a common picture of issues and situations;

¹⁶⁶Blue Force Tracker will be discussed further in the next chapter.

¹⁶⁷Blount, MAJ GEN Buford C., commander, 3rd ID, US Army. Net-Centric Operations Short Course Video Interview, 2004.

¹⁶⁸Blount interview.

collaborated on experiences; acted corporately; and continuously learned. Essentially, this web made us faster...”¹⁶⁹

Like the Army, the Navy also appears to be well prepared for a NCE transformation, both culturally and technologically.

US Marine Corps

The Marine philosophy of command and approach to subordinate decision-making is ideally suited to operating in a NCE. From a technology standpoint, however, the Marine approach is somewhat at odds with a NCE. Like the Army and the Navy, however, the Marines have experimented with the technological aspects of NCW.

On 30 March 2003, two Marine AV-8B Harriers performed close air support (CAS) over Iraq. The Harriers were equipped with Litening II targeting pods, specially modified with a Pioneer video feed. The forward air controller (FAC) they were working with was equipped with a Pioneer Mobile Receiving Station. Through a network, this receiving station enabled the FAC to see both a real-time video representation of what the pilots were seeing with their targeting pods and what the Pioneer was seeing with its camera. The result was a mere 9-minute lapse between the time the Harriers checked-in with the FAC until the target was destroyed, which was a dramatic improvement over the typical CAS mission.¹⁷⁰

The Marines, it would seem, may embrace NCW.

US Air Force

Technologically, the USAF nearly operates in a NCE today. There are endless examples of network-enabled systems throughout the USAF, from aircraft to the AOC. The issue within the USAF, however, is the cultural transformation in terms of knowledge-area capabilities. The USAF AOC

¹⁶⁹Zelibor, Rear Admiral Tom, commander, CTF-50, USN. Net-Centric Operations Short Course Video Interview, 2004.

¹⁷⁰Forsythe, Lt Col Jack, OSD Office of Force Transformation. “A-A / A-G Case Study brief,” lecture. Net-Centric Warfare Short Course, Vienna, MD., 9 March 2005.

weapon system concept seeks to adopt the technology-area capabilities of a NCE without embracing those of the knowledge-area.

According to Lieutenant General (retired) Mike Short, CFACC during the 1999 war over Serbia, there is a fundamental lack of understanding by senior USAF leadership about the role of leadership in a NCE. The current political environment has made it difficult, even prohibitive, for senior decision-makers to relinquish control in order to “let forces loose to make decisions on their own.”¹⁷¹ As a result, “We are without a doubt centralizing everything now” within the AOC.¹⁷² This problem is “not a function of technology. The network won’t fix it.”¹⁷³ The USAF has got to embrace the knowledge-area aspect of the NCE in order to achieve the real benefits of NCO.

Lieutenant General (ret) Eugene Santarelli, former PACAF/CV, agrees with Gen Short’s assessment. But, he sees the situation today as only temporary. Today’s USAF leadership are products of the Vietnam era. According to Gen Santarelli, “The Vietnam legacy is realistic training at the tactical level.”¹⁷⁴ The Red Flag and Aggressor programs at Nellis Air Force Base, Nevada, for example, are two such programs. “We didn’t learn the operational lessons of war from Vietnam. That’s being done right now.”¹⁷⁵ The insinuation, of course, is that in time the USAF will adapt to NCO based on the lessons of today.

The USAF, then, must alter its approach to the knowledge-area capabilities while continuing to foster its technical-area progress in order to adapt to operate in a NCE.

¹⁷¹Lt Gen (ret) Mike Short, US Air Force Senior Mentor, Hurlburt Air Force Base, FL., interviewed by author, 23 November 2004..

¹⁷²Short interview.

¹⁷³Short interview.

¹⁷⁴Lt Gen (ret) Eugene Santarelli, US Air Force Senior Mentor, Hurlburt Air Force Base, FL., interviewed by author, 23 November 2004.

¹⁷⁵Santarelli interview.

Conclusion

In spite of the potential pitfalls of transforming to operate in a NCE, the Joint Force must take proactive steps to embrace NCO. The 21st century threat demands that transformation. The Army and Marines are culturally poised to shift to operating in a NCE. From a technology standpoint, however, they have a considerable ways to go. Conversely, the USAF is well positioned to embrace the technical obligations of a NCE. From a cultural perspective, though, the USAF must back away from its centralized approach to commanding execution. The Navy, it seems, is in the best position today to transition to operate in a NCE. Their mission control and decentralized decision-making approach, coupled with their historic investment in technology, make them an ideal candidate to transform to NCO.

Although each of the services successfully experimented with NCW during recent combat situations, the modest capabilities of the adversaries in Afghanistan and Iraq may not have provided the ideal proving grounds for the concept. According to one defense analyst at the Lexington Institute, the lack of a formidable enemy undercuts recent successes with NCW. “The main reason for that is not DoD’s fault—it’s that the enemy turned out to be truly incompetent...The Iraqis made so many mistakes it would be foolish to conclude that defeating them proved the viability of the new strategy.”¹⁷⁶ At least according to some, then, the NCW’s true test is yet to come. Still, these successes endow enough legitimacy to NCW to further pursue its possibilities as a new way of warfare.

The turn of the 21st century has brought with it a new and unfamiliar era for the US military. The Industrial-Age culture, with its hierarchical structure and multiple layers of supervision, is giving way slowly to Information-Age ideas where span of control is much less constrained. In addition, the threats to national security emerging in the Information Age have begun to change the

¹⁷⁶Dan Caterinicchia and Matthew French, “Network-centric Warfare: Not There Yet.” *FCW.com*, 9 June 2003, n.p. On-line. Internet, 18 May 2005. Available from <http://www.fcw.com/article79869>.

dynamics of modern warfare. The US military, then, must also evolve in order to meet this threat. The avenue the US military has chosen to facilitate this transformation is the NCE.

The overriding benefit of operating in the Information Age is subordinate empowerment via information sharing, collaboration, and self-synchronization. Except in extraordinarily-sensitive, politically-charged circumstances, it is neither necessary nor desirable to centrally control US military forces on the 21st century battlefield. The fleeting nature of this emerging threat makes such centralized control impractical. The Joint Force, then, should be restructured, equipped, and trained for such operations. A Joint Planning and Monitoring Center is an integral part of that restructuring.

In closing, one cannot overlook the importance of education in a transformation project as radical as that currently underway within the DoD. Overturning the inertia of a century's-worth of Industrial-Age practices will take time to complete. Part of the motivation for writing this thesis is to begin the education process that will culminate in the DoD adapting to the net-centric environment.

GLOSSARY

ACCE	Air Component Coordination Element
AFDD	Air Force Doctrine Document
AOC	Air Operations Center
ASOC	Air Support Operations Center
ATO	Air Tasking Order
BCD	Battlefield Coordination Detachment
BCE	Battlefield Coordination Element
BDA	Battle Damage Assessment
BFT	Blue Force Tracker
CAF	Combat Air Forces
CAOC	Combined Air Operations Center
CAP	Crisis Action Planning
CAS	Close Air Support
C2	Command and Control
CFACC	Combined Force Air Component Commander
CFC	Combined Force Commander
CFLCC	Combined Force Land Component Commander
CFMCC	Combined Force Maritime Component Commander
CFSOCC	Combined Force Special Operations Component Commander
COI	Communities of Interest
COMAFFOR	Commander Air Force Forces
COP	Common Operational Picture
CTF	Commander, Task Force
DASC	Direct Air Support Center
DISA	Defense Information Services Agency
DISN	Defense Information System Network
DoD	Department of Defense
EUCOM	European Command
FAC	Forward Air Controller
FBCB2	Force XXI Battle Command, Brigade-and-Below
FCC	Federal Communications Commission
FM	Field Manual
FOC	Final Operational Capability
FSCL	Fire Support Coordination Line
FSCM	Fire Support Coordination Measures
GIG	Global Information Grid
GIG-BE	Global Information Grid Bandwidth Expansion
GNA	Goldwater-Nichols Act

HQ	Headquarters
ISR	Intelligence, Surveillance, and Reconnaissance
IT	Information Technology
JDCKP	Joint Doctrine Capstone and Keystone Primer
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JFLCC	Joint Force Land Component Commander
JFMCC	Joint Force Maritime Component Commander
JFSCC	Joint Force Space Component Commander
JFSOCC	Joint Force Special Operations Component Commander
JP	Joint Publication
JPMC	Joint Planning and Monitoring Center
JTF	Joint Task Force
K-ACCE	Kuwait - Air Component Coordination Element
MAAP	Master Air Attack Plan
MAAPTK	Master Air Attack Planning Toolkit
MCDP	Marine Corps Doctrine Publication
NCE	Net-Centric Environment
NCE JFC	Net-Centric Environment Joint Functional Concept
NCO	Net-Centric Operations
NCW	Net-Centric Warfare
NDP	Naval Doctrine Publication
NDS	National Defense Strategy
OAF	Operation Allied Force
ODS	Operation Desert Storm
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PC	Personal Computer
RF	Radio Frequency
SA	Situational Awareness
SACEUR	Supreme Allied Commander Europe
SECDEF	Secretary of Defense
TBMCS	Theater Battle Management Core Systems
TBONE	Theater Battle Operations Network-centric Environment
TST	Time-Sensitive-Target
US	United States

USAF
USMC
USN

United States Air Force
United States Marine Corps
United States Navy

VTC

Video Teleconference

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